

ES&H manual

Environment, Safety, and Health

Volume I

Part 2: ES&H Management Requirements

2.2 Managing ES&H for LLNL Work

(Formerly H&SM Chapter 2)

Recommended for approval by the ES&H Working Group

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New document or new requirements

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- ☐ New document
- ☒ Major requirement change
- ☐ Minor requirement change

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Terms and Definitions

Familiarity with the following terms will help with the ease of reading and understanding this document.

Authorizing Individual	The person designated by the authorizing organization that is responsible for a work activity's technical, financial, administrative, and ES&H objectives. Also, the individual authorized by the associate director (or his or her designee) to accept and manage the risks associated with the work on the Laboratory's behalf. This person authorizes the work to proceed once all controls have been verified to be in place.
Authorizing Organization	The Laboratory organization (e.g., directorate or group) responsible for the performance of the work activity. This includes ensuring adequate funding and determining the priorities in completing the work objectives.
Commonly Performed by the Public	An activity with hazards commonly accepted by the public, the control of which requires little or no guidance or training to perform the work safely.
<i>ES&H Manual</i>	A manual consisting of six volumes including what was formerly known as the Health & Safety Manual, the Environmental Compliance Manual, and other institutional ES&H documents.
Facility Point of Contact (FPOC)	A person appointed by the facility management chain to help personnel with facility issues and ensure that work in the facility is compatible.
Facility Safety Plan (FSP)	A safety document describing the longer-term hazards and applicable controls for the work activities in a facility. Formerly known as a Facility Safety Procedure.

Integration Work Sheet (IWS)	A document that records the scope of an activity, the Responsible Individual (RI), and the associated line management chain for the activity, the names of workers authorized to perform the activity, a list of the hazards and controls associated with the activity, and the fact that the work is authorized by an Authorizing Individual.
IWS Minor Change	Typographical corrections, personnel changes (except the RI), start / stop date changes, changes to the required training, title changes, and other changes to an IWS that do not potentially impact safety are defined as a "minor change."
IWS Major Change	Any change to an IWS that is not a "minor change" is defined as a "major change." Examples of a major change are changes in the RI, scope of work, work location, hazards or controls, and any safety significant change.
Generic/Blanket IWS	Generic/Blanket IWSs are work authorization documents that are applicable to routine WAL B & C work in a variety of locations. A Bridging document may be required to add job-specific information to the Generic/Blanket IWS.
Bridging document	A Bridging document contains job-specific details such as the location or specific personnel for work under a Generic/Blanket IWS. Bridging documents are used if more specific information is required to authorize a Generic/Blanket IWS.
Prestart Review	The review of a specific activity's safety controls, resources, and work schedule. Using a graded approach, the prestart review must occur prior to initiating the work activity. No documentation requirement exists for the prestart review of activities commonly preformed by the public.

Responsible Individual (RI)	The individual directly responsible for an operation, activity, or group of activities. The RI may be at any level within the organization and is formally identified by the activity's authorizing individual. In some organizations, the person is called the work supervisor. In most cases, the RI will be directing the work of others as part of the operation or activity.
Safety Basis Envelope (SBE)	An evaluation of the hazards and safety systems within a facility is performed to establish a set of facility operating limits. These limits make up the Safety Basis Envelope (SBE) that define the type of work that is permitted within that facility.
Safety Plan (SP)	A document that accompanies an IWS for WAL C activities. This document can be any of the following: (1) a completed safety plan form; or (2) a current Operation Safety Plan (OSP); or (3) the applicable sections of a Facility Safety Plan (FSP).
Subject Matter Expert (SME)	An employee at LLNL that is a recognized authority in a particular field and has been formally designated as the Work Smart Standard Subject Matter Expert for that topic. This might include a person from Hazards Control, the Environmental Protection Department, Engineering, Plant Engineering, Chemistry & Materials Science, Computations, etc.
Work Authorization Level (WAL)	A relative hazard ranking of an activity based on associated hazards. Work activities are planned, controlled, performed, and monitored according to one of three WAL levels.
Work Smart Standards (WSS)	The set of standards necessary to meet LLNL performance expectations and objectives. These standards are contractually agreed to by NNSA and LLNL, and are specified in the UC/NNSA Contract 48, Appendix G. The WSS provide adequate protection for workers, the public, and the environment.

2.2

Managing ES&H for LLNL Work

1.0 Introduction

1.1 Purpose and Scope

Work conducted at LLNL involves a variety of environmental, safety, and health (ES&H) hazards. The Laboratory manages these hazards using the Integrated Safety Management (ISM) system and by promoting safe behavior at all work levels. Integrated Safety Management consists of a fundamental LLNL guiding principle, seven general principles (which are discussed in Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management," in the *ES&H Manual*,) and five functions (shown on page two). Specifically, this document describes how the ISM functions are applied to LLNL work and the documentation required for work activities. It also contains other ISM requirements applicable to directorate-level management.

LLNL's *ES&H Manual* reflects ISM principles and commitments and describes the approaches the Laboratory uses to implement ISM and the Work Smart Standards (WSS). The *ES&H Manual* describes the primary institutional level quality assurance processes for ensuring adequate protection of the workers, the public, and the environment, and specifies where directorates managing facilities, operations, or activities need to take additional actions to ensure the quality of the ES&H program at LLNL. This document describes the five functions and general ISM principles.

1.2 Implementation Schedule

Under version 5.0 of the ISM System Description, the Work Authorization Levels (WALs) have been reduced to three levels and the Integration Work Sheet (IWS) has been streamlined. A new Safety Plan form (SP) has been introduced that can be completed and used as an addendum to an IWS. The combined document, IWS/SP, serves as a replacement for the Operational Safety Plan (OSP). See Table 1 for the implementation schedule.

1.3 Managing Hazards and the Graded Approach

The Laboratory manages its workplace hazards using a graded approach. The graded approach is a method by which the level of effort and detail associated with planning, controlling, performing, and monitoring ES&H issues is appropriate to the level of hazards associated with an activity.

Table 1. LLNL Implementation Schedule.

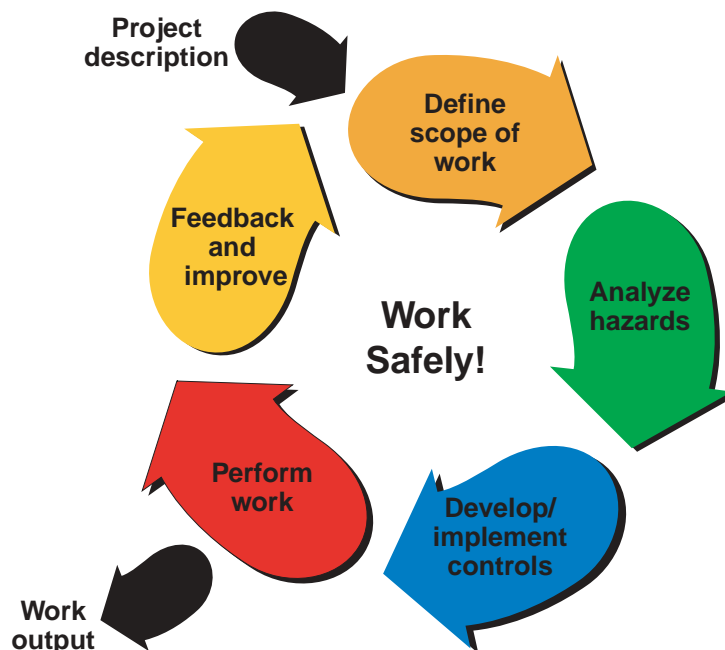
Change Description	New work/documents	Existing Work/Documents
Consolidation of Work Authorization Levels	January 31, 2003	Existing IWSs will be re-identified with the A-C levels without changing the content of the IWS with the use of a crosswalk before January 31, 2003.
Change from OSP to streamlined IWS/SP* with a limited review annually and complete re-authorization tri-annually.	January 31, 2003	IWSs and OSPs will be converted to the new streamlined IWS/SP form upon revision** or expiration (three years from the effective date of issue).

* Work covered by the Superblock Work Control/Design Change Control Process Manual shall follow the requirements stated therein and use of IWSs or conversion to IWS/SPs is optional.

** IWS shall be revised anytime there is a major change.

An activity with hazards commonly performed by the public, where the control of those hazards requires little or no guidance or training to implement the work safely, are managed using informal mechanisms. These activities, referred to in the *ES&H Manual* as activities commonly performed by the public, are Work Authorization Level (WAL) A, and comprise the first of three work authorization levels. Table A-1 provides examples of activities that fit within the LLNL definition of "commonly performed by the public."

An individual may initiate and conduct work that involves activities commonly performed by the public without implementing formal work review, authorization and documentation as long as they do not violate an established facility work control process.



Work consisting of activities commonly performed by the public can be self-authorized and only requires the individual's consideration of the associated hazards and a commitment to follow applicable public¹ and LLNL-specific requirements while performing the task. The determination that an activity falls into this category is competently made using common sense and good judgment. In many cases, this determination may involve a discussion between the person performing the work activity and his or her supervisor. The individual's work supervisor is responsible for being cognizant of the individual's work activities and concurring that the work does not require further review. Supervisors should discuss their expectations for safe work with their assigned workers. It is important for all employees to use common sense and think through the five ISM functions when performing these tasks because even activities commonly performed by the public may result in serious injuries or accidents if done inappropriately.

Note: Self-authorization is not allowed for work activities beyond those commonly performed by the public.

Personnel performing activities commonly performed by the public should be aware of bulletins issued by the Lessons Learned Program. For this reason, Responsible Individuals (RIs) should share Lessons Learned on topics related to their activities with the personnel performing the work. (Section 2.8 contains more information on LLNL's Lessons Learned program.)

For work involving activities beyond those commonly performed by the public, the authorizing organization is responsible for ensuring that the work has the required ES&H review and authorization documented on an IWS. Individuals shall not initiate or perform work-involving activities beyond those commonly performed by the public without review and authorization from the appropriate person in the management chain.

Based on the information developed in completing the IWS, work will fall into one of the two remaining WALs. See Table A-2 for examples of work activities requiring an IWS, and Table A-3 for examples of activities that will likely require preparation of an IWS with a safety plan.

1.4 Work Authorization Levels

The WALs are described below and summarized in Table 2. Unless otherwise indicated, a representative of facility management and the ES&H Team concurs with the

¹ All applicable public regulations for activities commonly performed by the public, such as driving automobiles and riding bicycles, are applicable and may be supplemented by LLNL-specific requirements stated in the technical documents of the LLNL *ES&H Manual*. No special hazards analysis or work approval is generally required for these types of activities.

Table 2 LLNL Work Activity Authorization Structure.

Work Authorization Level	Work Activity Category		Hazard Analysis Mechanism	Controlling Documentation	Work Activity Authorization		
					Authorization	Concurrence	Type of Prestart Review
A	Commonly performed by the public		Responsible Individual (RI)	ES&H Manual	RI	Supervisor (implied)	Informal confirmation of controls (undocumented)
B	Not commonly performed by the public, IWS preparation required	Standard controls with review	RI, Facility Point of Contact (FPOC) & ES&H Team ^(b)	IWS ^(a)	Authorizing Individual (AI)	FPOC & ES&H Team Leader ^(b)	Confirmation of controls
C		Supplemental controls	RI, FPOC, & ES&H Team	IWS with safety plan (IWS/SP)	AI	FPOC & ES&H Team Leader	Prestart Review

Notes: (a) References *ES&H Manual* and other applicable documents (e.g., Engineering Safety Notes, Permits, etc.), as appropriate.

(b) ES&H Team Leader or other ES&H reviewer designated by the ES&H Team Leader.

documentation required at each WAL. After the prestart review confirms the controls are properly implemented, the authorizing individual (AI) authorizes work.

1.4.1 Work Authorization Level A

Activities commonly performed by the public may proceed at an individual's discretion in accordance with generally accepted practices and applicable LLNL safety requirements. Because the work is self-authorized, the worker is the RI. No activity-specific documentation is required. The RI's supervisor is responsible for being cognizant of the RI's work assignments and informally concurring on the performance of activities commonly performed by the public.

1.4.2 Work Authorization Level B: Standard Controls with Review

Work activities just beyond those commonly performed by the public and governed by existing safety documents are designated as WAL B. Such activities require an IWS, whether the work is conducted onsite or offsite, to ensure proper planning, authorization, and documentation. Appropriate work controls are defined by references to the *ES&H Manual*, and other applicable documentation. Required authorization is by the identified AI, with concurrence of the Facility Point of Contact (FPOC) and the ES&H Team Leader (or designee). The AI shall verify that the controls are in place. For offsite work, the FPOC's concurrence is not applicable.

1.4.3 Work Authorization Level C: Supplemental Controls

An IWS with a safety plan (IWS/SP) is required to be prepared when: a) required by provisions of the *ES&H Manual*; or b) mandated by management. This is required whether the work is conducted onsite or offsite if LLNL has management responsibility. Authorization is by the AI with concurrence of the FPOC and the ES&H Team Leader, and a prestart review is required. For offsite work, the FPOC's concurrence is not applicable.

1.5 Determining the Work Authorization Level

The following organizations and individuals are to be involved in analyzing the hazards, identifying controls, and confirming readiness prior to authorizing work:

- The person authorizing the work activity (i.e., the AI).
- The person responsible for ensuring the safety basis envelope (i.e., the FPOC).
- The person who will be supervising the work (e.g., work supervisor or RI).
- When possible, the personnel who will be helping conduct the work.

- The ES&H Team and subject matter experts (SMEs). It is the responsibility of the authorizing organization to ensure that this approach is followed by those personnel who will be managing and performing the work activity.

The following describes the process for using the WAL:

1. Identify the work to be performed. Where possible, worker involvement is to be encouraged in defining specific work activities.
2. Evaluate the activity to determine if the work involves only activities that fit within LLNL's definition of being commonly performed by the public. The worker is responsible for consulting with the work supervisor, the FPOC, or the ES&H Team if unsure about the hazards or the applicable controls. It is important that a reasonable effort be made to analyze the hazards so that the proper level of review, documentation, and authorization is used before the work begins.
3. Consult with the FPOC to determine the requirements imposed by the facility in which the activity is to take place.
4. If the work involves activities that do not fit within LLNL's definition of commonly performed by the public, evaluate the work and document this evaluation on an IWS. Follow the *ES&H Manual* to determine the appropriate controls and to identify if a safety plan is required (see Table A-3). Document 3.3, "Facility Safety Plans and Integration Work Sheets with Safety Plans," in the *ES&H Manual* provides additional information on the processing of safety plans. Consult with the appropriate ES&H Team to interpret and assist in developing ways to satisfy requirements.
5. The person who will be authorizing the work, in conjunction with the facility management and the ES&H Team, determines the appropriate review and authorization level.

The IWS is used by the authorizing organization both as a screening mechanism to ensure the appropriate amount of effort and support is used during the work planning process and as a mechanism to record that the work has been authorized and is ready to proceed. This information facilitates the uniform analysis of hazards and development of other necessary ES&H documents, including utilization of applicable WSSs. By means of this analysis the authorizing organization ensures that the associated work hazards are identified, analyzed, and communicated to the staff involved in the activity. Additional guidance on analyzing the work hazards can be obtained from the area ES&H Team.

In addition, various facilities at LLNL have special requirements. Therefore, facility management shall review the IWS and concur that the work may be performed in the facility. The AI and facility management must agree on how the work is to be evaluated

and how the work controls are to be documented. If concurrence cannot be reached the issue will be appropriately elevated up the respective management chains.

The WAL prescribes the level of effort and support to be used in (1) analyzing the hazards and documenting the controls to be implemented, (2) confirming readiness in the prestart review, and (3) authorizing the work. Work is authorized after the prestart review confirms readiness. Appendix A provides examples of activities commonly performed by the public, examples of activities that require an IWS (both WAL B & C), and examples of WAL C work activities requiring a safety plan. Appendix B describes the IWS and how it is used in the ISM process. Appendix C discusses Facility Authorization Levels (FALs).

2.0 The Integrated Safety Management Work Process at LLNL

The following sections discuss how the five functions of ISM are used to manage work. In order to fully understand the ISM process, all LLNL personnel are trained in the principles and functions of ISM at a level appropriate for their specific-job duties and responsibilities. This training occurs through both institutional ISM training courses and organizational classes designed to ensure any ISM requirements specific to the facility and activity are understood.²

2.1 Plan the Activity (Function 1)

Work planning is to be performed (1) before beginning a new activity, (2) when changes are made to an ongoing work activity, and (3) prior to terminating an activity. The objective of the work planning process is to ensure the hazards associated with the work activity are clearly understood and appropriately addressed. Subject matter expertise shall be used as needed to ensure this objective is met.

The authorizing organization will identify the individuals responsible for planning the work activity and ensure the following elements are addressed:

- Specification of the scope of work to be performed.
- Identification of the facility in which that activity will take place.
- Appointment of an RI to supervise the work activity.
- Identification of the individuals in the management chain.
- Identification of resources and support services.

² Each directorate is responsible for assuring that the required ISM Training is appropriately documented in the LTRAIN system.

In addition, the elements listed below shall be considered during work planning.

2.1.1 Define the Work

The objective of the work activity is to be well understood so specific work elements can be defined. The location where the work is to be performed can then be identified. Once the work is defined, a project team can be assembled and the roles and responsibilities of each member determined and communicated.

Work planning should consider the entire scope of the activity from procurement to cleanup. Recognizing that many activities cannot be fully planned in the conceptual or proposal stage, the RI needs to work with the authorizing organization to think through all aspects of the work. The work scope may need to be defined in phases if the entire work scope cannot be fully planned from the beginning.

2.1.2 Balance Priorities

ISM Principle 4 requires that the management of ES&H issues shall be balanced with other project concerns (e.g., deliverables, milestones, other work in progress, and the various hazards associated with the activity). ES&H costs need to be included in the budget to ensure safety considerations are met, particularly if there is a short time schedule for completing the work. Adequate time and funding must be allowed to perform the work safely.

2.1.3 Worker Involvement

Workers are expected to be involved in work planning to ensure the activity can be accomplished as intended.³ The RI should consult the ES&H Team members during that portion of the planning process that deals with ES&H issues to help establish cost-effective alternatives, eliminate unnecessary requirements, and allow everyone participating in the work activity to understand the ES&H issues.

2.1.4 Facility Requirements

Personnel planning work must be sure that the activity can be performed in the proposed location or facility. Operations performed in a facility must be within the safety basis envelope and be compatible with other planned or ongoing operations within the facility. The safety basis envelope is determined during the authorization process as described in Appendix C. A Facility Safety Plan (FSP) may also be required. An FSP is a facility-specific document that is required for hazard-ranked facilities

³ It is recognized that many activities are planned before the personnel who will be performing the work are identified. In such cases, it is not possible to include the worker in the planning stage. However, once personnel are identified, they shall have the opportunity to understand the work requirements and raise any concerns.

above the classification of general industry. Document 3.3 contains the requirements for preparing an FSP. If there is a potential for interference with other nearby activities, more stringent controls may be required than would otherwise be necessary. In all cases, individuals shall obtain concurrence from facility management before performing WAL B and C work activities within a facility. Facility management's concurrence does not diminish the authorizing organization's responsibilities for authorizing work or managing ES&H issues specific to the work activity.

2.1.5 Terminating Activities

The authorizing organization is to ensure that adequate resources are made available to provide for the orderly closure, decontamination, and decommissioning of activities for which they are responsible.

When planning to shut down or terminate activities, the RI shall refer to the following documents:

1. Document 12.7, "Shutdown or Transfer of Facilities, Operations or Associated Equipment," in the *ES&H Manual* which includes the Laboratory Shop/Experiment Closeout Procedure.
2. Document 12.8, "Decontamination and Disposition of Process-Contaminated Facilities and Associated Equipment," in the *ES&H Manual*.

2.2 Offsite Work for LLNL

When LLNL employees perform work at offsite locations, supervisors shall review the work with the employee to confirm that it can be done safely. This review should be done using a graded approach. If the work is other than that commonly performed by the public, an ES&H evaluation shall be performed following the same ISM process as for onsite work. This evaluation shall analyze the expected hazards associated with the work offsite and confirm that adequate controls will be provided or that an existing ES&H program covers the work. The ES&H evaluation need not involve a site visit but may be satisfied with document reviews and phone or e-mail interviews of key personnel at that site. Evaluations of work done at other DOE sites or locations with ISM-like safety system may take credit for these systems and a less thorough evaluation may be warranted.

If the work is managed by a non-LLNL organization and the LLNL supervisor has confirmed that appropriate safety requirements are met, then the work can proceed following the safety protocols of the host location. An IWS is optional.

When LLNL manages the work offsite, and the activities are such that an IWS or IWS/SP would be prepared if the work were performed at LLNL, the document shall

be completed as outlined in Document 3.3. A person responsible for the ES&H program at the facility where the work will be performed must concur with the document if LLNL activities could impact their facility or personnel. The ES&H Team should review the work with staff from the offsite location (if available) and the RI shall confirm that adequate safety precautions are in place. Note that work performed at LLNL-managed facilities at the Nevada Test Site (NTS) may require additional work control documentation not described in this document.

Employees planning work-related foreign travel should be directed to the following web site for tips on travel safety.

http://www-r.llnl.gov/es_and_h/foreign_travel/pdf/travel.pdf

2.3 Guests

LLNL employees who invite guests (i.e., visitors, summer students, etc.) to the Laboratory for the purpose of conducting work shall evaluate the proposed work activities using the requirements outlined in the ES&H Manual. Work activities beyond those commonly performed by the public involving guests shall be reviewed, authorized, and documented on an IWS. The IWS process shall be used to determine if existing safety measures provide adequate controls to protect guests or if additional controls are necessary. Guests are responsible for following all Laboratory policies and procedures and reporting immediately unsafe conditions to their AI or RI.

The AI and RI are responsible for confirming that their guests have or receive ES&H training for the hazards associated with their planned LLNL work. The ES&H Team can assist in evaluating the equivalency between training received offsite and that required for LLNL personnel performing the same work. If prior offsite training is not equivalent, then the guest must receive the appropriate LLNL training before starting work. (See Document 40.2, "Environment, Safety, and Health Training and Education," in the *ES&H Manual*.) Under special circumstances and with concurrence of the ES&H team, a guest may be allowed to work if escorted and directly supervised by personnel knowledgeable in the hazards for the area. In addition, the same pre-placement and ongoing medical surveillance examinations as those required for LLNL employees performing the same work, are required for guests.

2.4 Analyze Hazards (Function 2)

An analysis of the hazards is performed for each activity prior to the start of work (including setup), or when the scope of the work changes. The analysis considers credible unexpected events as well as the defined scope of the activity. A basic step in this process is the determination of the appropriate Work Authorization Level (WAL).

Facility Authorization Level (FAL) guidance is provided in Appendix C of this document. The controlling documentation for each FAL is identified, as well as the necessary approvals and type of prestart review required. Appendix C thus facilitates uniform analysis of hazards and development of other necessary ES&H documents, including utilization of applicable WSSs. By means of this analysis the authorizing organization ensures that the associated facility hazards are identified, analyzed, and communicated to the staff involved in the activity. Additional guidance on analyzing the facility hazards can be obtained from the area ES&H Team.

Section 1.3 describes LLNL's approach to planning, controlling, and performing the work. The three levels of work authorization are defined, along with the corresponding requirements of controlling documentation and the necessary approval and prestart reviews. Because the controls for an activity depend on both the types and severity of the hazards, it is important to re-analyze the activity whenever a new hazard is introduced, when changes may decrease the effectiveness of identified controls, or when changes may impact nearby activities. Therefore, when there are changes in the work, the hazards are to be reviewed to confirm they are still within the scope of what was previously analyzed and that the ES&H controls remain adequate. This evaluation of changes includes reexamining the IWS, if one was prepared for the work.

Lessons Learned from ES&H analyses that would be particularly useful to others performing similar work are to be forwarded to the authorizing organization's Assurance Manager, as described in Section 2.8.

No matter how trivial the task may seem, all workers are responsible for thinking through and addressing the safety implications of their actions.

2.5 Determine Controls (Function 3)

ISM Principle 5 requires that safety standards and requirements shall be identified and followed. LLNL has selected a set of Work Smart Standards (WSSs) that are necessary and sufficient to protect people and the environment from hazards associated with its work activities. These standards are appended to the UC Contract. The controls from the WSS are either contained in or referenced in the Laboratory's *ES&H Manual*. AIs and RIs must work with their ES&H Team and SMEs as needed to ensure that all applicable controls are identified and appropriately tailored to the work activity.

Controls are used to protect people, property, and the environment from hazards and to reduce the risk(s) associated with an activity to acceptable levels. A control may also be established to prevent any significant new hazards from being introduced into ongoing work. Controls may be either engineered (e.g., barriers) or administrative in nature. Depending on the situation, both engineering and administrative controls may be necessary to afford an adequate level of protection from the work hazards.

The preferred hierarchy for effectively controlling hazards is as follows:

1. Eliminate the hazard by revising the design of the activity.
2. Reduce the risk through redesign or re-engineering of the activity.
3. Provide engineering controls.
4. Provide administrative controls, such as
 - Warning devices (e.g., horns, flashing lights, and signs).
 - Training, safety plans, and procedures.
 - Medical certification (e.g., respirator approval, enrollment in the Personnel Assurance Program or Personnel Security Assurance Program, Commercial Drivers License, etc.).
 - Medical surveillance to assure no adverse health effects.
5. Personal protective equipment (e.g., respirators, safety glasses, lab coats, gloves, and safety shoes).

As appropriate, subject-matter expertise from LLNL's scientists, engineers and ES&H professionals is to be utilized in the development of work controls. The ES&H SMEs assure that management is aware of any newly required controls and the WSS that have yet to be incorporated into the *ES&H Manual*. Additionally, they:

1. Identify when a proposed work hazard falls outside the controls from the WSS set.
2. Work with the authorizing organization to find or develop appropriate standards when the hazards are not covered by the WSS set.

Note: The organization conducting the work shall follow Document 2.3, "LLNL Exemption Process," in the *ES&H Manual* and get a waiver or exemption before work can begin.

2.5.1 Identify Controls Appropriate for Meeting Work Smart Standards

The *ES&H Manual* references and incorporates the set of approved WSS as they relate to specific work and controls. Thus, the controls in the *ES&H Manual*, or those based upon the WSS set that are identified as applicable to a given work activity are to be implemented by individuals performing the work, unless an exemption or waiver from those controls is granted. The process by which an exemption can be obtained is described in Document 2.3.

The RI for the work activity must ensure that applicable controls are identified for each hazard associated with the work activity. ISM Principle 6 requires that these controls be tailored to fit specific operations. This is achieved through the work review and

authorization process described in Section 1.3, Appendices A and B, and through the safety plan process described in Document 3.3. The review process considers the effectiveness of engineered and administrative controls.

Special controls may be required for decontamination, decommissioning, major building renovation or construction, demolition, ground disturbing activities, work in nuclear facilities, or the use of accelerators. Further information on these special requirements may be obtained from the ES&H Team.

2.5.2 Engineered Controls

Installed engineered controls are generally more effective than administrative controls if properly designed. Examples of engineered controls include containment, confinement, shielding, interlocks, fences, barricades, and equipment guards. Electronics Engineering, Mechanical Engineering, and Plant Engineering, as well as the ES&H Departments, provide the expertise for the design and installation of controls, as well as appropriate use of quality assurance principles and processes as described in the *ES&H Manual*.

Equipment and systems, and engineered controls are designed and installed in accordance with requirements contained in the *ES&H Manual* and, as applicable, the codes in the WSSs. Safety criteria for equipment procured from an outside manufacturer must be specifically detailed in the requisition if the equipment itself inherently involves ES&H issues. LLNL's Technical Release Representatives (TRRs) can provide additional information on this requirement. Consult with LLNL's SMEs about other requirements applicable to engineered controls.

2.5.3 Administrative Controls

The most common administrative controls used to control hazards are required training, procedures, signs, warning devices, and limits. Administrative controls may be strongly influenced by such things as subjective interpretation, job pressure, distraction, forgetfulness, and population variability. Engineered controls are preferred wherever practicable.

Training/Professional Skills/Physical Capabilities. All personnel shall have the training required to perform their work in a safe and environmentally sound manner. The Laboratory shall provide the training needed to enable its employees to meet safety standards. The authorizing organization is responsible for ensuring that the resources required for safety training are provided. Payroll organizations are to verify that their personnel have the required training and necessary medical certification/surveillance. The RI is to ensure that personnel supporting their activities have the required safety training, or that they work under the direct supervision of a trained individual.

Personnel are to be selected for assignments based on having a minimum set of basic required professional skills, training, and physical capabilities. Some job assignments may also require medical certification or surveillance. Consult the ES&H Team for current requirements.

All Institutional Training Requirements must be satisfied for all personnel working at LLNL. Many employees, such as professionals with advanced degrees and craft persons, have special skills required to perform their work. These skills, as well as experience, are to be taken into consideration when determining if an individual needs additional training or if detailed procedures are to be developed. The following sources are available to help identify the training requirements for specific hazards:

- Document 40.1, "LLNL Program Training Manual," in *the ES&H Manual*.
- Livermore Training Records and Information Network (LTRAIN).
- Topical documents found in the Laboratory's *ES&H Manual*.
- IWSs with SPs.
- ES&H Team Leader or Directorate Training Manager.
- Programmatic training managers.

Work Procedures. In situations where a work process must be formalized to provide adequate control, procedures will be developed in accordance with the requirements of Document 3.4, "Preparation of Work Procedures," in the *ES&H Manual*. Development and review of safety-related procedures are more efficiently completed by means of uniform processes in the preparation of these procedures.

Safety Sign and Warning Devices. Signs and warning devices (e.g., rotating beacons, horns, etc.) are used to identify areas where hazards exist in order to alert employees to the hazards and inform them of required actions. Other access controls may be installed as safeguards. Document 12.1, "Access Control, Safety Signs, Safety Interlocks, and Alarm Systems," in the *ES&H Manual* contains additional information on this topic.

Manufacturer Operating Instructions. Most commercial equipment comes with operating instructions such as specifications, procedures, or operating limits. Manufacturer's Operating Instructions are to be followed. An analysis of the hazards is to be performed whenever deviations are made from the Manufacturer's Operating Instructions to determine if other controls are necessary.

Preventative Maintenance. Equipment must be evaluated to determine the appropriate frequency for preventative maintenance. The manufacturer's instructions may provide more specific requirements.

Hazardous Material Quantity Limits. The health and safety factors associated with a variety of materials at LLNL are controlled by limiting the quantity that may be allowed (i.e., used or stored) within a facility. Since it is important for workers to understand the applicable limits for each facility, inventory control processes and important hazardous material quantity limits shall be described in the FSP.

Personal Protective Equipment. LLNL provides suitable equipment to protect personnel from hazards in the workplace. The hazards analysis identifies when personal protective equipment (PPE) is needed. The ES&H Team shall be contacted for assistance in determining the PPE best suited for an operation.

2.5.4 Guidance for Controls for Hazards Not in the *ES&H Manual*

There are three types of situations for which controls are not specified in LLNL's *ES&H Manual*: (1) hazards for which no standards exist or for which no controls have been developed, (2) hazards governed by standards that may exist but have not yet been accepted into the Laboratory's WSS set, and (3) hazards for which WSSs apply, but the controls have not been described in the *ES&H Manual*. This latter case includes controls for many activities commonly performed by the public (e.g., the state Vehicle Code applies to driving automobiles, but is not reproduced in the *ES&H Manual*). In all cases, it is the responsibility of the work supervisor to determine the controls required to protect the health and safety of workers, the public, and the environment. Contact the area ES&H Team for additional guidance.

2.5.5 Developing Controls for Activities that are NOT in Compliance with Established Standards

In cases where activities cannot comply with the requirements specified in established standards, a variance or waiver must be sought from the authority having jurisdiction (LLNL, NNSA, etc.) by the Work Smart Standard SME and obtained prior to beginning work. Document 2.3 provides the requirements in this area.

2.6 Authorize and Perform Work (Function 4)

ISM Principle 7 requires that work be authorized. Before work begins or when there are significant changes in ongoing work, the RI and the AI ensure that the hazards are analyzed and controls implemented. At a minimum, confirming readiness specifically involves ensuring the following conditions have been met:

- The management chain has been documented. This chain includes the first line work supervisor up to the responsible Associate Director. Both the RI and the AI must be identified and named in the work authorization documentation.

- The hazards and associated controls involved with the work activity have been identified and communicated to the staff conducting the activity.
- Appropriate controls are in place and operational and applicable safety requirements have been met.
- Workers understand who is responsible for managing the work activities and they understand the work activity and its controls.
- Adequate funds, personnel, and time exist to conduct work safely from work initiation through termination and clean up.
- Hardware and tools are available, the facility is operable, and the equipment is ready for operation.
- Required safety systems are correctly operating and tested.
- ES&H documentation is completed, maintenance of safety systems is scheduled, and permits are issued.
- Personnel possess the necessary skills, knowledge, abilities, and physical capabilities to carry out their assigned tasks. They must know their responsibilities and be trained, qualified, or certified (if needed) for the operation unless they will be working under direct supervision of a properly trained individual while performing the specific work activities for which their training is incomplete or not current.
- Applicable facility requirements pertaining to the work have been met, and facility management has concurred that the work may be performed in the facility. Additional guidance on facility prestart reviews and readiness assessments can be found in Appendix C.
- Any exemptions or waivers to the controls in the *ES&H Manual* or required by WSS have been approved according to the process described in Document 2.3.
- Required National Environmental Policy Act (NEPA) review is complete and approved.
- Contract modification has been completed for any new or revised work requiring an addition to or modification of the WSS set.

As part of this review process, workers are to be provided an opportunity to comment on any proposed operating procedures and other safety-related documentation they are expected to follow.

The process used to confirm readiness is dependent on the WAL. At a minimum, the reviews to confirm readiness are documented by completion of the IWS.

2.6.1 Informal Confirmation of Controls

Activities that fit within LLNL's definition of commonly performed by the public are considered WAL A. The worker determines readiness by confirming that the work will be performed according to pre-established controls. This includes controls documented in the *ES&H Manual* and any applicable FSPs as well as controls that would be applicable were the work to be publicly performed. (An example is ensuring that the Vehicle Safety Code will be followed when driving to a meeting.) This confirmation is informal and does not need to be documented. WAL A is the only type of work activity that may be self-authorized. Supervisor concurrence is implied by virtue of the work assignment.

2.6.2 Confirmation of Controls

WAL B is assigned to activities that do not fall within LLNL's definition of commonly performed by the public but which involve hazards that are not institutionally required to have controls beyond those established by the *ES&H Manual* or other existing approved safety documents. Readiness is determined as defined by the AI in conjunction with the FPOC and ES&H Team Leader (or designee). Readiness is documented on the IWS. The authorizing organization conducts the prestart review for WAL B activities for the AI. The review may be documented simply by the AI's approval of the IWS, authorizing the activity to proceed. The AI may require a written review, particularly if there are deficiencies or additional items that must be completed before the work can begin.

2.6.3 Activity Prestart Review

Increased effort is required to determine readiness when the *ES&H Manual* requires the development of work-specific controls (WAL C). In these situations, the activity prestart review is used to confirm readiness. The AI (typically the program leader,) and FPOC are involved in the determination of readiness if the work will be performed at LLNL. The ES&H Team Leader (or designee) shall also be included in the pre-start review if safety issues are involved. The determination that the controls are in place and the work is ready to proceed is documented on the IWS/SP. The topics to be considered during an activity prestart review are the same for all activities, as follows. The depth and detail of the review and the formality / documentation of the review vary with the complexity of the work and the level of hazards.

- A description of the work activity.
- A discussion of the hazards.
- A discussion of the controls, including worker qualifications.

- A discussion of the work plan, including how the work will be done, phases, milestones, etc.
- A review of the safety documents including Lessons Learned.
- A review of special, activity related training requirements and accomplishments, as applicable.
- A review of maintenance plans, interlock inspections, etc. as applicable.
- A review of environmental documentation (NEPA, permits, cultural resources, endangered species, etc.).

The prestart review for WAL C activities is conducted as directed by the AI, after the RI declares that he or she is ready for the prestart review. The AI assembles an appropriate review team, which may consist of peers, workers, SMEs (either technical or ES&H), and the FPOC or facility manager. Selection depends on the identified hazards and complexity of the work involved. The review may include formal presentations describing the work activity, hazards, controls, and results anticipated from the work. The review shall include the IWS, referenced safety documents, activity training records, related maintenance plans (if required), and logs. It may also include drawings and diagrams.

A written report may be necessary as determined by the AI. When a written report is required, the report shall address the following:

- The topics reviewed and the evaluation of the readiness to begin operations.
- Any deficiencies that were identified.
- Those deficiencies that have to be corrected before work can proceed, and those that can be corrected while the activity is being conducted.

A formal Operational Readiness Review (ORR) or Readiness Assessment (RA) may also be required for startup or restart of a facility. See Appendix D and Document 51.4, "Startup and Restart of Nuclear Facilities," in the *ES&H Manual* for more information on these reviews.

2.6.4 Authorization Agreements

LLNL and NNSA have agreed to establish special authorization agreements for specific facilities and/or activities involving unusual nuclear hazards. The purpose of the authorization agreements is to provide a definitive understanding and documentation structure that includes the Authorization Basis for the facilities and/or activities covered, consistent with Contract 48.

An important feature of authorization agreements is that they contain the necessary specific considerations and determinations required for the particular facilities and/or activities. The agreements between NNSA and the Laboratory provide authorization for these facilities and activities when following the processes described in the applicable ISMS Descriptions.

2.6.5 Performing Work

All Laboratory operations, projects, and experiments are to be performed in accordance with applicable controls (e.g., those specified as part of the work authorization as well as those in the *ES&H Manual*).

Each worker, his or her immediate supervisor, and others in the management chain are responsible for adhering to the safety controls established for the activity and for ensuring that any accidents or injuries are properly reported. When an incident occurs or a systemic failure is identified that affects worker safety, the environment, or public health, the authorizing organization is responsible for either ensuring a review is conducted or for assisting NNSA investigators in conducting a review that falls within their purview. (Document 4.6, "Incident Analysis Manual," and Document 4.3, "Occurrence Reporting & Processing of Operations Information," in the *ES&H Manual* contain more information on reviewing and reporting unplanned events.) The authorizing organization's management chain then ensures that necessary changes are made to relevant policies, procedures or hardware and that Lessons Learned from such events are communicated as described in Section 2.8.

2.7 Monitoring, Feedback, and Improvement (Function 5)

Both the RI and the AI are responsible for monitoring the work activity to ensure:

- The governing procedures and safety documents are being followed.
- The work being performed is within the scope of what was authorized and the controls remain adequate.
- Any changes in personnel or their capabilities, work procedures, equipment, and facilities are recognized and appropriately addressed.

Monitoring the work activity may range from informal walkthroughs of the activity to more formal project reviews.

In the event it is determined that the approved WAL or the FAL has been exceeded, the work activity's operating limits or controls are not being followed, or common sense indicates people, property, or the environment are at risk for being hurt or damaged, the affected work is to be suspended until appropriate remedial actions are taken. In addition, each worker is responsible for bringing to the attention of his or her

immediate work supervisor opportunities for improving the work or governing procedures. Each worker is empowered to suspend work, without fear of repercussion, if there is an unsafe or unapproved condition.

Routine surveillance and work monitoring are mechanisms that can be used to ensure that hazards are periodically reviewed and controls remain effective and in place while the work is being performed. Managers must use their experience and knowledge of the work activities to perform the appropriate monitoring of work.

In addition to informal monitoring (e.g., walkthroughs), each Directorate is required to perform scheduled assessments for its organization's activities, experiments, and facilities in accordance with criteria set forth in Document 4.1, "Directorate ES&H Self-Assessment Program," in the *ES&H Manual*. Each Directorate is responsible for analyzing, tracking, trending, and correcting safety-related problems and deficiencies associated with their operations and facilities following requirements identified in Document 4.2, "Environmental, Safety, and Health Deficiency Tracking System," in the *ES&H Manual*.

LLNL gathers site-wide information from monitoring its various activities and develops Performance Measures that indicate Laboratory performance in a variety of areas. This Performance Measure information is accessible to all employees. In addition, each Directorate is responsible for having metrics to evaluate its safety performance. This includes illness and injury statistics available on the web at:

http://www.llnl.gov/OCM/Appendix_F.html

Based on the information derived from the various performance monitoring and feedback processes, appropriate improvements are to be made in the *ES&H Manual*, and any relevant safety-related documentation or analysis.

2.8 LLNL's Lessons Learned Program

Another feedback mechanism used at LLNL is the Lessons Learned Program. The Hazards Control Department regularly reviews both internal and external incidents and promptly provides feedback to LLNL personnel and outside organizations—both verbally and through a published bulletin called "Lessons Learned." This information is also available through the ES&H web page at

http://www-r.llnl.gov/es_and_h/

Information obtained through reviews and issues raised by the members of the ES&H Working Group and experiences identified by LLNL personnel are used in the Lessons Learned Program.

Safety Lessons Learned are to be shared in order to improve operational safety and facilitate cost effectiveness by benefiting from the experience of others. Lessons Learned are to be prepared and distributed whenever there is an opportunity to share a valuable new work practice or warn others of an adverse practice, experience, or product.

Directorates are to encourage employees to bring to the attention of their supervisor or directorate Assurance Manager topics that could serve as possible Lessons Learned.

All Lessons Learned communications follow the basic format of what happened, lessons learned from the incident, where to get additional information or help, and recommendations on actions to be taken.

The Lessons Learned Coordinator is responsible for:

- Gathering and analyzing information from internal and external sources based on experiences considered relevant to Laboratory operations.
- Establishing and maintaining a communications and coordination process with the Laboratory's Price Anderson Amendment Act (PAAA) Office on topics and items of mutual interest and use.
- Coordinating a review of prospective Lessons Learned by the various ES&H support organizations, including the ES&H Working Group executive committee.
- Distributing Lessons Learned as appropriate.
- Serving as a point of contact for follow-up and feedback to the institution, as necessary, on actions taken in response to Lessons Learned.
- Posting LLNL-generated Lessons Learned considered of particular interest outside of LLNL on the "external" website.
- Posting LLNL's Lessons Learned on the "LLNL only" website.

Each Assurance Manager is responsible for:

- Assuring distribution of Lessons Learned to appropriate personnel.
- Bringing to the attention of the ES&H Working Group appropriate Lessons Learned in a timely manner.
- Identifying those Lessons Learned of sufficient impact to require follow up and tracking of implementation.
- Screening Lessons Learned before forwarding them to the Lessons Learned Coordinator.

The organization authorizing the work is responsible for ensuring that the applicable Lessons Learned maintained on the LLNL website are considered during the process of authorizing the work. The directorates are responsible for reviewing Lesson Learned during the Directorate's self-assessment program to ensure continued utilization of relevant Lessons Learned.

Program and facility management are responsible for ensuring that Lessons Learned are distributed to appropriate personnel. Lessons Learned are to be incorporated, as appropriate, into LLNL safety training in a timely manner.

3.0 ES&H Documentation

ES&H documentation is prepared as necessary to ensure that accurate and consistent information is communicated to all Laboratory workers so that they can perform work safely and in an environmentally sound manner. ES&H documentation is also prepared to comply with the following:

- LLNL requirements.
- NNSA requirements.
- Regulatory requirements.

In order to meet these document objectives, authors, RIs, reviewers, and AIs are responsible for ensuring that the instructions are useable and understandable to the individuals performing and managing the work. As a way of accomplishing this, authors are strongly encouraged to involve individual workers in the preparation of documents, as appropriate. By signing their name on the review and authorization sheet, these individuals are agreeing that the documentation meets the above objectives and is consistent with applicable rules and requirements. Where requirements are particularly complex or ambiguous, the RI is to utilize the appropriate ES&H professionals and other SMEs to interpret and assist in developing ways to satisfy requirements. The *ES&H Manual* is also available on the web for this purpose.

Safety documents are to be readily available to all individuals who need access to the information in order to perform their work activities safely. Safety documentation may be maintained in hard copy or the use of equivalent electronic systems is acceptable. Safety documentation can be found by contacting your ES&H Team. In addition, the ES&H e-Library is an electronic repository for LLNL safety documentation. See the following website:

http://www-r.llnl.gov/es_and_h/esh_library/

3.1 Documented Facility Safety Analyses

Various documents are used to record the results of specific analyses conducted to determine facility categories and authorization levels. They are prepared in conformance with requirements specified in the Laboratory's *ES&H Manual*, regulations, and applicable DOE orders, using a graded approach. Hazards and associated controls identified in a documented facility safety analysis shall be incorporated into or referenced in the area FSP. Requirements on facility categories and authorization levels are located in Appendix C, Document 3.1, and Document 51.1, "Safety Analysis Report for Category II and III Nuclear Facilities," in the *ES&H Manual*.

3.2 Environmental Documentation

The documents listed below can take from a few weeks to several years to prepare and obtain full approval depending on the complexity of the proposed work. Managers responsible for preparing these documents are to contact their ES&H Team for specific requirements.

- **Radioactive and Mixed Waste Life Cycle Plans.** The life cycle planning process is used to evaluate potential waste and to identify any waste that does not have an identified path to disposal. In most cases prior to waste generation, planning is performed to address the entire life cycle for all radioactive and mixed waste streams. The Radioactive and Hazardous Waste Management Division evaluates the potential waste stream to identify characterization, storage, management, treatment, and disposal strategies.
- **NEPA/CEQA Documents.** Management must evaluate proposed actions or changes to existing activities or work locations to determine the environmental impact review requirements. Both the requirements set forth in the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) apply to LLNL operations.
- **Permits.** Regulatory agencies place controls on the Laboratory's operations and discharges to the environment, through the use of permits. New projects must be analyzed to determine applicable permit requirements. Authorizing managers are to contact their ES&H Team for assistance.
- **Pollution Prevention and Waste Minimization Plans.** The LLNL Pollution Prevention/Waste Minimization (PP/WM) Plan covers pollution prevention and waste minimization activities. New activities are to be reviewed to identify possible pollution prevention and waste minimization techniques and conformance to PP/WM requirements.

3.3 Integration Work Sheet

Once it has been determined that the work involves activities that do not fit within LLNL's definition of commonly performed by the public, the RI shall prepare an IWS (see Appendix B). The IWS documents the scope of work, work locations, hazards and controls to be used, personnel working on the project, training, medical surveillance, permits, and documentation requirements for the project. As appropriate, the IWS may include existing safety plans, provisions of the *ES&H Manual*, or identify the need for further ES&H review to ensure the proper control of the activity-related hazards.

The FPOC shall evaluate the IWS to ensure the work is within the safety basis envelope and is compatible with other work activities in the area. The FPOC will also coordinate with the RI if facility modifications are required for the proposed activity.

The ES&H Team (or their designee) shall review and concur on the IWS to ensure front-end identification of the hazards associated with the work activity and to facilitate the application of appropriate controls.

The AI confirms resources are adequate for accomplishing the technical objectives consistent with ISM requirements. The AI must ensure that if resources are not adequate, the scope of work is modified to fit within the budget schedule or staffing or additional resources are obtained. The AI ensures a management chain is clearly identified and documented and that ISM requirements are followed.

The AI authorizes the work with the IWS. New or revised work activity may not begin until it has been authorized. The AI must ensure the IWS and any additional required documentation has been completed, the controls confirmed to be in place, and the FPOC and ES&H Team have concurred before authorizing the work activity.

An IWS may cover a single activity, or a phased activity. Activities are defined as an operation, experiment, project, equipment installation or removal, equipment testing or equipment/process start-up, facility or laboratory construction/modification project. Activities may be grouped together, so long as all of the activities that are not commonly performed by the public are identified and analyzed. An activity may proceed in several phases before commencing normal/routine operations (e.g., laboratory modifications, equipment installation, start-up and testing of equipment). Each phase may require a separate ES&H evaluation to review the hazards if the work activity cannot be evaluated as a whole prior to the start of work. Multiple safety plans may be required to address the various phases of activity during pre-operational start-up and testing of items (e.g., use of Class 3 and 4 lasers, certain toxic materials, or x-ray machines).

It is not necessary to re-review each task and generate a new IWS every time the task is performed, only when a significant ES&H-related aspect of the work activity extends beyond what has been previously analyzed and authorized by the authorizing organization.

If the review of the IWS identifies that the work falls within WAL B, the FPOC and ES&H Team (or designee) shall concur on the IWS. If the review of the activity identifies the work falls at WAL C, an SP is required. See Document 3.3, "Facility Safety Plans and Integration Work Sheets with Safety Plans," in the *ES&H Manual* for more information on safety plans for WAL C IWSs. Examples of activities that are designated as WAL C work warranting an SP are outlined in Appendix A. Final determination of the need for a safety plan should be made through consultation with the ES&H Team and program management. See Figure 1 for a flowchart on the IWS process.

3.3.1 Review and Revision

IWSs shall be revised anytime there is a change of scope of the work authorized. This may include changes in the activity, identification of previously unknown hazards, changes in location, or significant staff changes. In the event that the RI is no longer able to exercise his or her roles and responsibilities (e.g., change of assignment or termination from the organization), the AI is responsible for appointing a replacement, or the work is to be stopped. In the event that the AI is no longer able to exercise his or her roles and responsibilities, the authorizing organization is responsible for appointing a replacement. Until a replacement AI is appointed, the next individual up on the management chain, described in the IWS, serves as AI. The authorizing organization is responsible for documenting all changes to the IWS, and ensuring that workers on the IWS are made aware of the changes.

IWSs that reference the hazards and controls in a safety plan should be reviewed whenever the referenced document is reviewed, to verify that all of the provisions of the IWS are still correct.

The RI should periodically review the IWS with the individuals who are working under the IWS to ensure that they retain a solid understanding of the hazards and controls, and to solicit feedback on possible improvements in the activity.

As part of each Directorate's Self-assessment program, a sample of all IWS shall be regularly reviewed for accuracy. Those found to contain obsolete information shall be revised in a timely matter.

Integration Work Sheet

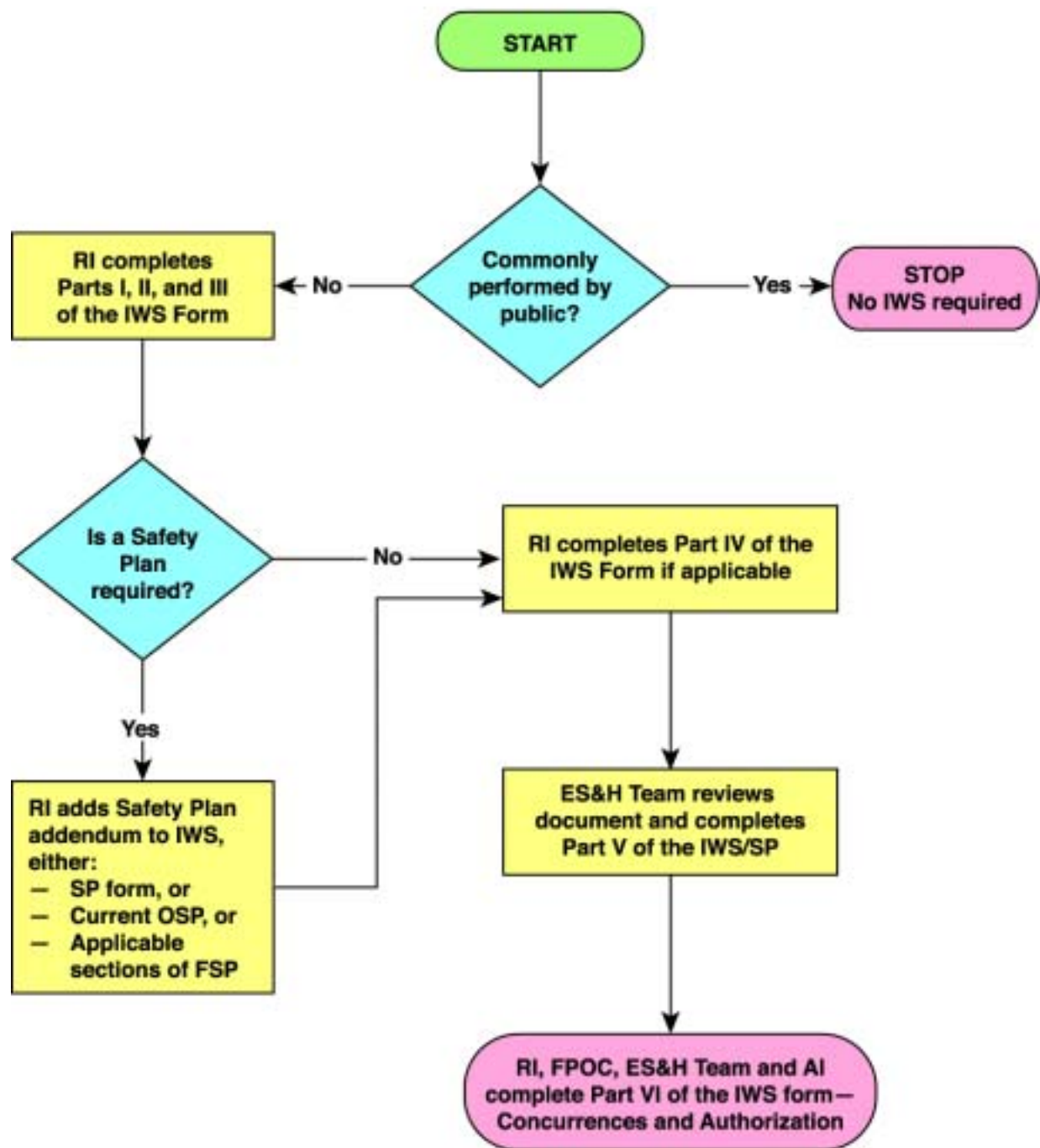


Figure 1. Integration Work Sheet—Decision Flow.

3.3.2 Changes to an Authorized Integration Work Sheet

Changes to an authorized IWS can be one of two types:

Minor Change. A minor change is defined as:

- Typographical corrections.
- Personnel changes.
- Start or stop date changes.
- Title changes.
- Other changes that improve safety or that do not adversely affect safety or the environment.

The RI can make a minor change. Consultation with the ES&H Team is encouraged to assure that the change fits within the minor change category. The original document shall be marked with minor change date and the original document shall have the changes made to the document. An equivalent electronic system may be used. The ES&H Team, FPOC, AI, and affected personnel (if applicable) shall receive a copy of the amended document. No further distribution of the change is required.

Major Change. Any change that is not a minor change is defined as a major change. Examples of a major change are:

- An increase in the scope of work.
- A change in the work location.
- Changes in the hazards or controls that may adversely affect safety or the environment.
- Changes in operations that increase the hazard level or introduce additional hazards.
- Changes that decrease safety.

A major change requires the same level of concurrence and authorization as required by the initial document review. A revision number is assigned to the document to denote that a change has been made. The revised document is re-distributed to all concerned parties.

3.4 Generic/Blanket Integration Work Sheets and Bridging Documents

Generic/Blanket IWSs are work authorization documents that are applicable to routine types of work in a variety of locations. Rather than writing a specific IWS for each job as it occurs, a generic/blanket IWS describes the work activity, the hazards and controls

associated with the work, and the training, medical surveillance, etc. that may be required to safely perform this activity. The exact site location that the work is authorized is either listed or given only in general terms such as "Site 200 laboratories." The personnel that are authorized to perform this work may be listed or this information may be provided later in the Bridging document. As work activities are planned, generic/blanket IWSs are then used to authorize the work.

If more specific information is required, an IWS Bridging document is used to provide the specific details for the given location and/or specific personnel that are performing the job. Bridging documents with job-specific information shall receive concurrence by the site FPOC. The ES&H Team shall also concur on the Bridging document if new hazards not previously assessed by the ES&H Team are introduced. The AI shall authorize Bridging documents. Examples of types of work where generic/blanket IWSs are useful are routine building surveys, building alterations or repairs, maintenance and construction activities, etc. When a work request has additional hazards that are not covered by a generic/blanket IWS, then a job-specific IWS is required.

To accomplish craft-related work services in facilities operated and managed by other programs, the FPOC shall make the Plant Engineering (PE) Job Manager aware of unique hazards that are present in a facility or area in which the services are to be performed. In addition, Plant Engineering is responsible for communicating to the program any hazards associated with the craft service requested. Plant Engineering shall use a Bridging document to confirm this communication. Concurrence is required between the FPOC for the facility or area where the work is to be performed and the responsible PE craftsperson and PE Job Manager performing the work. PE is authorized to proceed with the work request only after concurrence is completed using the Bridging document.

3.5 Facility Safety Plans

Facility specific plans are required for hazard ranked facilities and they are titled Facility Safety Plans (FSPs).

FSPs describe the safety, health, and environmental controls applicable to specific facilities. These plans are to be developed in accordance with the requirements found in Document 3.3. Facility management prepares FSPs with input from organizations using the facility. An FSP may limit or deny authorization for an activity that would otherwise be permissible.

3.6 ES&H Safety Documentation for Emergency and Urgent Repair Work

Emergency repair work is the immediate steps taken to make safe and/or stabilize an emergency. These steps are only taken under the direction of the LLNL Fire

Department, ES&H Team Leader, or the Environmental Duty Officer; however, Plant Engineering personnel may also direct this type of work.

Once emergency actions are completed and a situation has stabilized, urgent repair or remediation may be needed. Urgent repairs consist of those actions needed to either return a stabilized emergency situation that has residual ES&H concerns to a safe condition or to avoid unacceptable property damage. Examples of this may include water cleanup after a pipe break, repair of safety systems, repair and restoration of power, ventilation, or LCW to critical systems. See Appendix D for the specific procedure that shall be followed by those affected for off-shift emergency or urgent response.

3.7 LLNL-Issued Work Permits

Permits are required for certain operations to ensure potential hazards are identified and the necessary precautions are in place before beginning work. Table 3 lists the various types of permits required at the institutional level.

3.8 Standard Operating Procedures and Activity Procedures

During the initial ES&H review, it may be determined that the work activity requires additional specific work procedures to minimize the possibility that an unacceptable error could occur if a specific sequence of steps is not followed. Examples where a standard operating procedure might be deemed necessary include work activities that are particularly complex and/or hazardous, or work involving personnel having little experience with LLNL controls (e.g., guests). When possible, personnel who will be performing the work are to be provided an opportunity to participate in the development of such work procedures. At a minimum, workers shall be allowed to review the proposed work procedures and offer comment. These procedures will include the following elements:

- A description of required materials and personnel qualifications.
- Concise instructions in a logical sequence.
- Situations that could initiate problems.
- Expected alarms or equipment operations.
- Actions to be taken in response to an unusual event.

Specific requirements for the development of safety-related procedures are contained in Document 3.4.

Table 3. Types of permits issued at LLNL. All references are found in the *ES&H Manual*.

Permit for	Issued by
Soil evacuation, grading, and/or drilling	Plant Engineering to ensure documentation of identified underground utility for safety purposes, to track soil for ES&H purposes, and to evaluate cultural and natural resources. (See Document 2.5, "Procured Services Subcontractor ES&H Program," Document 33.3, "Management of Soil and Debris," and Document 33.4, "Cultural and Paleontological Resources.")
Building and/or equipment drain ^a	Plant Engineering to ensure compliance with the Laboratory's Storm Water Pollution Prevention Plan. (See Doc. 32.2, "Management of Retention Tank Systems," and Document 42.1, "Management of Facility Design and Construction.")
Interior concrete floor, wall, and ceiling penetration	Plant Engineering to ensure the safety of systems and utilities at the Laboratory. (See Document 2.5 and Document 42.1.)
Asbestos work	ES&H Team to ensure limited-scale work performed by LLNL and other personnel are in compliance with regulations. (See Document 14.9, "Safe Handling of Asbestos-Containing Material.")
Work in confined spaces	ES&H Team to ensure personnel working in such areas are protected from hazards. (See Document 18.7, "Working in Confined Spaces.")
Hot work	Emergency Management Division (Fire Department) to ensure personnel who perform welding, soldering, and other hot-work operations with a high fire potential are aware of and protected from hazards. (See Document 22.5, "Fire.")
Hazardous work (explosives) (Form LL-1968)	ES&H Team to ensure new construction, modification, maintenance, or repair work performed in any area designated as an explosives storage or handling area at Livermore or Site 300 is properly controlled. (See Document 17.1, "Explosives.")
Lead work ^b	ES&H Team to ensure that any operation that will result (or may be reasonably expected to result) in exposure above the exposure limit is performed in compliance with regulations. (See Document 14.1, "Chemicals.")
Radiation work	ES&H Team to ensure that the magnitude of radiation hazards and procedural, physical, and administrative controls are identified. (See Document 20.1, "Occupational Radiation Protection.")
Roof access	FPOC to ensure that personnel who access the roofs of buildings with restricted access and general access classifications do so in accordance with regulations. (See Document 15.1, "Roof Access.")
Hazard Assessment and Control Form	Issued by the ES&H Team to assure respirators and other personal protective equipment are specified and appropriate for the work to be performed. Also used to identify monitoring or other special requirements needed for the work activity. (See Document 11.1, "Personal Protective Equipment.")

^a Any equipment or fixture that discharges water into the environment or a sanitary sewer system must be documented and a permit must be issued if discharge destinations or sources are affected.

^b A permit is not required if the operation is described in a current safety plan or procedure, or in a current negative exposure assessment.

4.0 Additional Integrated Safety Management Requirements

In addition to the ES&H requirements described above, LLNL has identified other requirements that are directed at upper management (i.e., at the directorate-management level). These requirements are described below.

4.1 Return to Work Program

The objective of a case management program is to return injured personnel to work as soon as reasonably possible consistent with the individual's personal health and safety.

Associate Directors or equivalent are responsible for putting in place within their organizations a "lost and restricted days" or "return to work" case management program consistent with LLNL's case management program guidelines. The details of LLNL's Return to Work Program are contained in Document 10.1, "Occupational Medical Program," in the *ES&H Manual*.

4.2 Injury Prevention Programs

The Laboratory has established as its safety goal to continuously strive for a healthy, accident free, and environmentally sound workplace and community while providing the scientific and technical excellence needed to meet critical national missions. Each directorate and equivalent organization is responsible for having in place defined programs to prevent injuries and assure a healthy workplace.

The Directorate programs shall:

- Identify and appropriately analyze all the injuries associated with their organization's operations and facilities. The Hazards Control Department will provide each Directorate with injury statistics and related information.
- Draw upon institutional resources, especially information provided by the ES&H Teams and the Office of Risk Management in developing an understanding of injury types and causes within their organization.
- Consider the potential of work practices and conditions that could materially contribute to their organization's accident and injury rates. Appropriate steps are to be implemented by the directorates for addressing identified areas of concern.
- Track their performance relative to Contract 48 performance measures and improve their programs as needed, so that the Laboratory can meet its overall illness and injury goal.

4.3 Accountability Requirements

Workers, supervisors, and managers are directly responsible for ensuring their own safety and the safety of others who could be impacted by their actions. All members of the workforce are held accountable for meeting the Laboratory's environmental, safety, and health requirements and expectations as defined in Document 2.1. Directorates are responsible for having in place effective processes to implement, measure, and reinforce Laboratory safety expectations. Accountability includes positive reinforcement for meeting safety expectations and negative consequences for failing to do so.

Directorates are to establish incentive programs to encourage exemplary safety behavior and performance. Each directorate's incentive program is to utilize the Directorate Awards Program to promote exemplary safety behavior and performance. Possible structures for incentive programs are provided in Table 4. The Directorate program should be a planned activity designed to motivate people, increase awareness, and to improve safety. To accomplish these objectives, directorates should consider the following factors in developing the program:

- Establishing specific goals and objectives.
- Encouraging creativity.
- Establishing methods for measuring performance.
- Communicating the incentive program.
- Defining awards.
- Specifying the performance period.

Table 4. Possible Structures for Incentive Programs.

Individual	Group
Rewarding a manager for group performance	Rewarding all members of the group for the group's performance
Rewarding the individual for individual performance	Rewarding the best group in a competition
Rewarding individuals for innovative ideas for improving safety	Rewarding groups for innovative ideas for improving safety

Awards should be given in a timely fashion to reinforce desired behavior. Directorates are encouraged to consult their ES&H Team for additional suggestions.

In cases of ES&H misconduct, directorates are to apply progressive discipline consistent with LLNL's Personnel Policies and Procedures Manual, Section E, II.

Each Payroll organization is to maintain records of all safety awards and corrective actions it administers. A summary of these records is to be reported to the Deputy Director of Operations (DDO) no later than one month after the end of each fiscal year. The DDO is to compile these reports into a Laboratory summary for management information and use.

4.4 Impact of Safety Performance on Appraisals and Ranking

Consistent with the Laboratory's safety goal and policy, management is responsible for explicitly stating safety expectations for each employee and evaluating each individual's safety performance, and reinforcing positive safety behavior.

1. In establishing safety expectations and evaluating performance, factors that might be considered for each individual, as appropriate, are:
 - a. Roles, responsibilities and authorities associated with the individual's position and assignments.
 - b. Safety related complexity associated with their assignment and the facility in which they are working.
 - c. Facility-specific factors.
 - d. Incorporation of safety considerations during work planning, including appropriate time and resource allocation (qualified people, space, equipment, time, and money).
 - e. Appropriate evaluation of the hazards associated with work activities.
 - f. Implementation of work controls.
 - g. Timely satisfaction of training requirements.
 - h. Safe conduct of daily activities.
 - i. Bringing unsafe situations and opportunities for improvement to the attention of others, as appropriate.
 - j. Properly reporting accidents and injuries.
2. For supervisors and managers, consideration is to be given to:
 - a. Expectations and performance in establishing and implementing safety processes such as
 - Defining the scope of the work.
 - Assuring the controls for hazards are effectively implemented to reduce the residual risk associated with the work activity to an acceptable level.

- Assuring that workers have the necessary skills, knowledge, and abilities to evaluate the potential risk and to perform work safely.
 - Properly authorizing the defined work subject to the appropriate controls.
 - Assuring that workers understand the work controls and perform the work safely and in conformance with applicable controls.
- b. In addition, consideration might be given to organizational performance with respect to
- Accidents and injuries.
 - Adherence to safety requirements.
 - Proactive actions taken to enhance safety.
 - Any activity the authorizing management chain determines needs a plan based on an evaluation of a proposed activity.
3. Safety expectations are to be documented and communicated, and the employee given the opportunity to provide feedback.
4. A substantive assessment of safety performance is to be included in each individual's performance appraisal. For managers and supervisors, the appraisal is also to address performance in establishing and implementing safety processes.
5. Safety responsibilities and safety performance are to be explicit considerations during the annual ranking process and an important factor in determining salary actions and promotions.

5.0 Work Standards

The LLNL's Integrated Safety Management System Description, UCRL-AR-132791, V5.0, March 19, 2002 is the controlling standard for this document. The current version of the ISMS Description is available at

http://cmg.llnl.gov/es_and_h/ism/isms.html.

6.0 References

Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management," in the *ES&H Manual*.

Document 2.3, "LLNL Exemption Process," in the *ES&H Manual*.

Document 3.1, "Safety Analysis Program," in the *ES&H Manual*.

Document 3.3, "Facility Safety Plans and Integration Work Sheets with Safety Plans," in the *ES&H Manual*.

Document 3.4, "Preparation of Work Procedures," in the *ES&H Manual*.

Document 3.5, "Conduct of Operations for LLNL Facilities," in the *ES&H Manual*.

Document 4.1, "Directorate ES&H Self-Assessment Program," in the *ES&H Manual*.

Document 4.2, "Environmental Safety and Health Deficiency Tracking System," in the *ES&H Manual*.

Document 4.3, "Occurrence Reporting and Processing of Operations Information," in the *ES&H Manual*.

Document 4.6, "Incident Analysis Manual," in the *ES&H Manual*.

Document 10.1, "Occupational Medical Program," in the *ES&H Manual*.

Document 12.1, "Access Control, Safety Signs, Safety Interlocks, and Alarm Systems," in the *ES&H Manual*.

Document 12.7, "Shutdown or Transfer of Facilities, Operations, or Associated Equipment," in the *ES&H Manual*.

Document 12.8, "Decontamination and Disposition of Process-Contaminated Facilities and Associated Equipment," in the *ES&H Manual*.

Document 19.1, "LLNL Ergonomics Program," in the *ES&H Manual*.

Document 20.6, "Criticality Safety," in the *LLNL ES&H Manual*.

Document 40.1, "LLNL Training Program Manual," in the *LLNL ES&H Manual*.

Document 41.1, "LLNL's Quality Assurance Program," in the *ES&H Manual*.

Document 41.2, "Configuration Management Program Description," in the *ES&H Manual*.

Document 51.1, "Safety Analysis Reports for Category II and III Nuclear Facilities," in the *ES&H Manual*.

Document 51.3, "LLNL Unreviewed Safety Question (USQ) Procedure," in the *ES&H Manual*.

Document 51.4, "Startup and Restart of Nuclear Facilities," in the *ES&H Manual*.

Planning and Conduct of Operational Readiness Reviews (ORRs) in the LLNL ES&H Manual.)

7.0 Resources for More Information

Lessons Learned

Several Lessons Learned have been developed that contain information pertaining to improving how we manage work. These Lessons Learned may be accessed through the Environment, Safety and Health web page at:

http://www-r.llnl.gov/es_and_h/

Contacts

Additional information on the implementation of Integrated Safety Management may be found in the "ES&H Contact List" at

http://www-r.llnl.gov/es_and_h/esh-manual/esh_contact.pdf

or obtained from the ES&H Team and the Directorate Assurance Managers.

Other Sources

DOE G 450.4-1, Integrated Safety Management System Guide.

Appendix A

Examples of Work Authorization Level A, B, and C Work Activities

Introduction

There is no simple rule for determining when a safety plan is required. The need for such plans is determined by management's evaluation of what is required to minimize hazards to the environment, the public, and Laboratory personnel. The authorizing organization and the ES&H Team determine the need for a safety plan based on the review of the IWS.

Table A-1 provides examples of activities that generally fit within the LLNL definition of "commonly performed by the public." Table A-2 provides examples of activities that do not fit this definition and will likely require preparation of an IWS. Table A-3 provides examples of activities that will likely require preparation of an IWS plus a safety plan.

Table A-1. Examples of WAL A Activities Commonly Performed by the Public, not requiring an IWS. All document references are found in the *ES&H Manual*.

Activity	References to Applicable Controls for Activities Commonly Performed by the Public
Driving an automobile or riding a bicycle for personal transportation (not the transport of hazardous or radiological materials or waste)	State Vehicle Code; Document 21.3, "Vehicle Operations and Traffic," and Document 11.2, "Hazards — General and Miscellaneous."
Office work, work at a computer terminal, moving boxes, light equipment with no other hazards, and other office supplies	Document 11.2 and Document 19.1, "LLNL Ergonomics Program."
Performing visual inspections and condition surveys in non-hazardous areas or under escort by a person trained in the potential hazards. Use of commercial laser pointers, commercial bar-code readers, or laser surveying instruments in accordance with manufacturer's instructions Use of a step stool or ladder (with your feet less than 6 feet above the working surface) to reach something that is not hazardous	Document 11.2. Document 20.8, "Lasers." Document 11.2.
Using a handcart or truck to move non-hazardous objects.	Document 15.2, "Manual and Mechanical Material Handling."
Bench top soldering on a circuit board (ventilation may need further review if lead solder is used)	Document 22.5, "Fire."
Using an ultrasonic cleaner with non-hazardous solvents	Document 11.2, and Document 18.6, "Hearing Conservation."
Use of commercial products, such as a space heater, using a vacuum cleaner, using Christmas lights or extension cords, coffeepots, microwave ovens, etc.	Document 22.5, follow manufacturer's instructions; watch Lessons Learned for Product Alerts.
Storing books and other office supplies, having plants in the office	Document 11.2, and Document 22.4, "Earthquakes."
Food preparation (non-laboratory areas)	Document 13.3, "Sanitation."
Working with power hand tools (e.g., electrical hand drills, saws, etc.) with non-hazardous materials (e.g., wood, steel, or aluminum)	Document 11.2.

Table A-2. Examples of Activities that Require an IWS (both WAL B and C levels). All documents referenced are found in the *ES&H Manual*.

Activity	References to Applicable Controls for Activities NOT Commonly Performed by the Public
Working with laboratory animals	Document 13.5, "Vertebrate Animals Used in Research."
Performing removal and replacement of mechanical support hardware where the potential exists for worker injury due to moving or shifting material/equipment	Document 42.1, "Management of Facility Design and Construction."
Working with human tissues	Document 13.1, "Biological Controls and Operations" and Document 13.2, "Exposure Control Plan: Working Safely with Blood and Bloodborne Pathogens."
Using large quantities (>5 lbs.) of dry ice or cryogenics where the potential of asphyxiation or harmful skin contact exists	Document 18.5, "Cryogenics."
Performing work on energized equipment >50 volts exposed, and/or >10 joules stored energy	Document 16.2, "Work and Design Controls for Electrical Equipment."
Working with capacitors, >10 joules stored energy	Document 16.1, "Electrical Safety."
Working with large batteries (>50 volts and short circuit current >10 amps)	Document 16.1.
Using Class III or IV sealed radioactive source for any activity, including checking detection instruments	Document 20.2, "LLNL Radiological Safety Program for Radioactive Materials."
Operation of a Class I, II, III, or IV Radiation-Generating Device (RGD)	Document 20.3, "LLNL Radiological Safety Program for Radiation-Generating Devices."
RGD maintenance and repair operations (including interlock bypass operations that are not covered under a SP.)	Document 20.3.
To control entry into and to perform work within Radiological Areas (e.g., Radiation Areas and Contamination Areas)	Document 20.1, "Occupational Radiation Protection."
Testing the performance of a thin-film fuel cell (hydrogen and high temperatures)	Document 18.4, "Hydrogen" and Document 22.5, "Fire."
Working with lithium hydride	Document 14.7, "Safe Handling of Alkali Metals and Their Reactive Compounds," and Document 20.1.
Testing small beryllium oxide samples	Document 14.4, "Implementation of Chronic Beryllium Disease Prevention Program Requirements."
Packaging or shipping hazardous materials, including wastes	Document 21.1, "Acquisition, Receipt, Transportation, and Tracking of Hazardous Materials," Document 13.1, "Biological Controls and Operations" and Document 36.1, "Waste Management Requirements."

Table A-2. Examples of Activities that Require an IWS (both WAL B and C levels). (cont.) All documents referenced are found in the *ES&H Manual*.

Activity	References to Applicable Controls for Activities NOT Commonly Performed by the Public
Using or storing radioactive materials (other than sealed sources and consumer products) greater than background level for any activity	Document 20.2, "LLNL Radiological Safety Program for Radioactive Materials."
Developing, using, or testing explosives of any type	Document 17.1, "Explosives."
Performing building and building system alterations and repairs where a potential safety hazard exists or a facility hazard control is adversely affected	Document 42.1, "Management of Facility Design and Construction" and Document 2.5, "Procured Services ES&H Program."
Operations with insignificant quantities of fissionable materials with special concerns	Document 20.6, "Criticality Safety."
Operation of fixed machine tools, such as drill press, lathe or milling machine operating on non-hazardous materials (e.g., wood, steel, or aluminum)	Document 11.2, "Hazards — General and Miscellaneous."
Activities requiring special care in the selection of personal protective equipment (PPE)	Document 11.1, "Personal Protective Equipment."

Activities that Require an Integration Work Sheet with a Safety Plan -WAL C Activities

All work at LLNL beyond activities commonly performed by the public must be authorized with an IWS. Depending on the level of hazards associated with the activity, a SP may also be required. Determination of the need for an SP will be made during the ES&H assessment of the IWS. Examples of activities that warrant an SP are outlined below. Please note that this is not a complete list; refer to the applicable *ES&H Manual* document for complete guidance. Final determination of the need for a safety plan should include consultation with the ES&H Team and program management.

Table A-3. Examples of WAL C Work Activities, Requiring an IWS/SP. All documents referenced are found in the *ES&H Manual*.

Activities That Require a IWS/SP		References
Biological	Biological Agents: Operations involving Select Agents, USDA-regulated materials, bloodborne pathogens, prions, large scale (> 10 liter amounts) of any biological research material, biological agents or other biohazards that are not addressed in the <i>ES&H Manual</i> .	Document 13.1, "Biological Controls and Operations."
	Human tissue: Working with viable human tissues.	Document 13.1 and Document 13.4, "Research Involving Human Subjects."
	Laboratory animals: Working with laboratory animals.	Document 13.5, "Vertebrate Animals Used in Research."
Chemicals	Chemical handling in laboratories that do not meet the requirements of the "LLNL Chemical Hygiene Plan for Laboratories."	Document 14.2, "LLNL Chemical Hygiene Plan for Laboratories."
	Toxic, corrosive, and reactive gas: All toxic, corrosive, and reactive gas use unless agreed upon by the ES&H Team	Document 14.3, "Toxic, Corrosive, or Reactive Gases," and Document 14.6, "Safe Handling of Fluorine."
	Mercury: Operations where mercury or mercury compounds will be heated. Any activity involving organomercury compounds.	Document 14.5, "Safe Handling of Mercury and Mercury Compounds."
	Alkali Metals: Operations involving liquid alkali metals or certain operations involving solid alkali metals. Operations involving any amount of cesium (Cs), sodium-potassium (NaK) alloys, and Rubidium (Rb). Use of > 500 grams (during the length of an experiment or a period of one year) of lithium (Li), sodium (Na), or potassium (K).	Document 14.7, "Safe Handling of Alkali Metals and Their Reactive Compounds."
	Beryllium: The processing or handling of beryllium that is likely to generate dusts, mists, fumes, or particulates.	Document 14.4, "Implementation of the Chronic Beryllium Disease Prevention Program Requirements."
	Carcinogens: Use of some carcinogens as listed in the <i>ES&H Manual</i> .	Document 14.12, "Safe Handling of Carcinogenic Materials."
	Perchloric acid: Operations where perchloric acid is heated or boiled, at concentrations greater than 75% on a weight basis, involving the disassembly or maintenance of a perchloric acid ventilation system.	Document 14.8, "Working Safely with Corrosive Chemicals."

Table A-3. Examples of WAL C Work Activities Requiring an IWS/SP. (cont.)

Activities That Require a IWS/SP		References
Construction/ Equipment/ Working Surfaces	Access beyond a red warning light: Any routine activity requiring access beyond a red warning light while the experiment is in progress.	Document 12.1, "Access Control, Safety Signs, Safety Interlocks, and Alarm Systems."
	Bypassing Interlocks: Any activity requiring the bypassing of interlocks.	Document 12.1.
	Removal and replacement of mechanical support hardware: Performing removal and replacement of mechanical support hardware where the potential exists for worker injury due to moving or shifting material/equipment	Document 42.1, "Management of Facility Design and Construction" and Document 2.5, "Procured Services Subcontractor Environment, Safety, & Health Program."
	Performing building and building system alterations and repairs where a potential safety hazard exists or a facility hazard control is adversely affected	Document 42.1 and Document 2.5.
	Cranes: Any maintenance activities on a crane trolley platform, when using a crane as a work platform or to support a man-basket, when lifting explosives with a crane or a hoist, or any planned lift that exceeds the rated capacity of the crane or hoist.	Document 15.3, "Crane, Hoist, and Rigging Safety."
Electrical	Electrical equipment: Work on any Hazard Class 3 or 4 electrical equipment that has exposed live parts.	Document 16.2, "Work and Design Controls for Electrical Equipment."
	Portable electrical equipment: Operation of portable electrical equipment with an ungrounded conductive enclosure, except listed, double-insulated equipment.	Document 16.1, "Electrical Safety."
	Power systems: Performing work on power distribution and transmission systems.	Document 16.1 and Document 16.2.
	Energized equipment: Performing work on energized equipment ≥ 245 volts exposed, or ≥ 10 joules stored energy.	Document 16.2.
	Large batteries and short circuit currents: Working with large batteries or battery systems (≥ 245 volts) and short circuit current (≥ 10 amps).	Document 16.1 and Document 16.2.
	Capacitors >10 joules: Working with capacitors, >10 joules stored energy.	Document 16.1 and Document 16.2.

Table A-3. Examples of WAL C Work Activities Requiring an IWS/SP. (cont.)

Activities That Require a IWS/SP		References
Explosives	Explosives, explosive formulations, and low energy initiators: Development, handling or use of explosive materials or devices, use of mock explosives in close proximity to fissile material, and any operation with Low Energy Initiator (LEIs).	Document 17.1, "Explosives," and Document 17.2, "LLNL Energetic Materials Stability Review Program," and Document 17.3, "Low-Energy Initiator (LEI) Operations," and Document 17.5, "Controlling Nuclear Explosive-like Assemblies (NELAs) and their Mock Components."
Machine Tools	Machining of toxic, radioactive or explosive substances with fixed or portable equipment.	Document 11.2 "Hazards — General and Miscellaneous."
Pressure	Pressure systems with hazardous materials: Operations with pressure systems that contain toxic or flammable liquids or gases.	Document 14.6, "Safe Handling of Fluorine," Document 18.2, "Pressure Vessel and System Design," and Document 18.4, "Hydrogen."
	Cryogenic fluids used in pressurized vessels or piping systems not verified or built to the specified requirements.	Document 18.1, "Pressure," and Document 18.5, "Cryogenics."
	Large quantities of dry ice or cryogenics: Using large quantities (>5 lbs.) of dry ice or cryogenics where the potential of asphyxiation or harmful skin contact exists.	Document 18.5.
	Hydrogen and high temperatures: Testing the performance of a thin-film fuel cell.	Document 18.4, "Hydrogen" and Document 22.5, "Fire."
Radiation-ionizing	Fissionable material: Handling, storage, and transport of significant quantities of fissionable material. Operations that involve fissionable materials that include "special concerns," glove box operations, or the addition or modification of equipment.	Document 20.6, "Criticality Safety."
	Radiation-Generating Devices (RGDs): Safety-interlock bypass operations (except maintenance and repair), open beam operations, field radiography, operation of Class II and III RGDs (with exceptions), and operation of Class IV RGDs.	Document 20.3, "LLNL Radiological Safety Program for Radiation-Generating Devices."
	Radioactive materials areas: Work in Type I, II, and III workplaces unless the authorizing individual and the ES&H Team health physicist jointly determine that a safety plan is not necessary.	Document 20.2, "LLNL Radiological Safety Program for Radioactive Materials."
	Sealed sources: Use of Class IV sealed radioactive sources, unless the authorizing individual and the ES&H Team health physicist jointly determine that a safety plan is not necessary.	Document 20.2.

Table A-3. Examples of WAL C Work Activities Requiring an IWS/SP. (cont.)

Activities That Require a IWS/SP		References
Radiation-non-ionizing	Class 4 laser: Laser is operated as a Class 4 laser.	Document 20.8, "Lasers."
	Unattended laser: Unattended invisible Class 3b or 4 laser operations that do not conform to standard conditions.	Document 20.8.
	Two or more Class 3b lasers: The project using two or more Class 3b lasers under specific situations.	Document 20.8.
	Non-LLNL personnel using lasers: Non-LLNL personnel using Class 3b or 4 lasers when managed by LLNL personnel.	Document 20.8.
Radiation-non-ionizing (cont.)	Intentional viewing of Class 2 or above lasers: Intentional viewing of Class 2 or above lasers or the use of optical viewing aids close to the beam.	Document 20.8.
	Outdoor or offsite use of Class 3b or 4 lasers: Outdoor or offsite use of Class 3b or 4 lasers or laser systems when operated or managed by LLNL personnel.	Document 20.8.
	Joint operation of lasers: Lasers or laser systems will be operated jointly with another organization.	Document 20.8.
	Lasers lacking Safety Controls: The laser operation does not include all mandatory safety controls listed in Document 20.8.	Document 20.8.
	Radio-frequency radiation: Equipment that generates radio-frequency microwaves exceeding specified limits.	Document 20.7, "Nonionizing Radiation and Fields (Electromagnetic Fields and Radiation with Frequencies Below 300 GHz)."
Transportation	Flying: Operation of any airborne vehicle.	Document 11.2 "Hazards — General and Miscellaneous."
Other Hazards	Diving activities (other than snorkeling) that are part of the work assignment.	Document 11.2.
	Offsite activities if assessed to be at the WAL C level where LLNL has full or partial management responsibility.	Document 2.2, "Managing ES&H for LLNL Work."
	Deviations to ES&H Manual Requirements: Operations where controls are needed beyond those required in the <i>ES&H Manual</i> .	Document 2.3, "LLNL Exemption Process."
	Any activity that the Responsible Individual or management determines an SP is required.	Document 2.2.

Appendix B

Preparation and Use of the Integration Work Sheet

The form at the end of this appendix is presented as the standard IWS showing the minimum information that is to be documented for activities that do not fit within LLNL's definition of what is commonly performed by the public. The AI is responsible for ensuring the work is appropriately reviewed and the IWS is properly completed and has facility management and ES&H Team concurrence.

The RI shall perform the following tasks, and the AI is responsible for ensuring the tasks have been completed:

1. Completion of information contained in the IWS. The activity or, if applicable, the particular phase of the activity for which an ES&H evaluation is requested must be fully described.
2. Identification of all applicable hazards and environmental concerns in the hazards list. If necessary, additional information on chemicals/materials and their quantities, and details on selected hazards is provided.
3. Identification of the applicable controls. This includes those identified in the *ES&H Manual* as well as those required by WSS. The ES&H Team and appropriate SMEs shall be consulted if there is any doubt about the controls.

The RI signs the IWS, and submits it to the FPOC, the ES&H Team or designee, and the AI.

Next Steps for WAL B

1. The IWS is reviewed by the ES&H Team, or designee, and any others specified by the program. If appropriate, the ES&H Team will conduct a hazard assessment and any additional documentation will be developed. This may include environmental permits and NEPA documents.
2. When all controls are confirmed to be in place, the FPOC and ES&H Team or designee have concurred on the work, and required documentation developed and approved, the AI will authorize the work to proceed by signing the IWS.
3. The RI will receive a copy of the signed IWS from the AI, and is responsible for ensuring the work is reviewed and copies of the IWS are distributed to the personnel performing the work activity. The RI shall also distribute copies of the IWS to payroll supervisors, the FPOC, and the ES&H Team. An equivalent electronic system may be used.

Additional Steps for WAL C

1. The ES&H review shall be conducted by the ES&H Team.
2. A safety plan shall supplement the IWS with further safety information. See Document 3.3 for more information on IWS/SPs.

Integration Work Sheet (IWS)

IWS _____ ☐ SP attached _____ Title: _____

PART I ADMINISTRATIVE INFORMATION (completed by RI)					
Management Chain: Name of Responsible Individual (RI), Alternate RI, names of line managers between the RI and Authorizing Individual (AI), name of AI, name of the Authorizing Organization and title of AD					
Location	Facility	Room(s)	FPOC	ES&H Team	Intended Start Date: _____ <input type="checkbox"/> or to be determined Est. Completion Date: _____ <input type="checkbox"/> or ongoing
Employees (E) & Guests (G) assigned to this activity:					
Name	E or G	Employee #	Name	E or G	Employee #
PART II SCOPE OF WORK & SP (completed by RI)					
Scope of Work: Describe the work activity, emphasizing the safety aspects of the work (not the scientific basis) and the use of hazardous material. or <input type="checkbox"/> scope of work attached					
Safety Plan (SP) —Is there a current SP (SP form or OSP or FSP) covering this work? <input type="checkbox"/> Yes- attach# _____ <input type="checkbox"/> New SP needed—attach _____ <input type="checkbox"/> SP not needed (see ES&H Manual Doc 2.2 App. A)					
PART III HAZARDS/ENVIRONMENTAL ASPECTS & CONTROLS (completed by RI)					
Hazards/Environmental Aspects and Controls: Check off the hazards involved in the work.					
<input type="checkbox"/> Biological <input type="checkbox"/> Infectious materials/other biohazards (pathogens, human fluids protein toxins, recombinant DNA, exposure to sewage) <input type="checkbox"/> Sharps/ needles <input type="checkbox"/> Human use experiments <input type="checkbox"/> Lab animals <input type="checkbox"/> Other animals (wild, domestic, insects) <input type="checkbox"/> Toxic plants <input type="checkbox"/> Food for humans <input type="checkbox"/> Other _____					
<input type="checkbox"/> Chemical <input type="checkbox"/> Flammable, volatile or fuming <input type="checkbox"/> Toxic materials (acutely toxic, toxic, systemic toxin, toxic gasses) <input type="checkbox"/> Corrosives /irritants <input type="checkbox"/> Reactive materials (e.g., air/water sensitive; pyrophoric; thermally, shock, or friction sensitive; perchlorate) <input type="checkbox"/> Carcinogens, mutagens, reproductive hazards <input type="checkbox"/> Pesticides <input type="checkbox"/> Beryllium <input type="checkbox"/> Materials of special concern (e.g., alkali metals, fluorine, asbestos, lead, mercury, PCB) <input type="checkbox"/> Other regulated metals (e.g., chromium, copper, nickel, zinc) <input type="checkbox"/> Other _____					
<input type="checkbox"/> Construction/Equipment/Working Surfaces <input type="checkbox"/> Construction, maintenance, modification, demolition <input type="checkbox"/> Asbestos removal <input type="checkbox"/> Safety system maintenance (deactivated alarms, interlock bypass) <input type="checkbox"/> Drilling, excavation, grading <input type="checkbox"/> Working on contaminated equipment <input type="checkbox"/> Service, maintenance, or modification of de-energized equipment <input type="checkbox"/> Moving/lifting large or heavy items (including use of cranes/hoists, powered lift) <input type="checkbox"/> Machine tools/powder-actuated tools <input type="checkbox"/> Welding, soldering, thermal cutting <input type="checkbox"/> Stored potential energy <input type="checkbox"/> Sharp edges/ shears <input type="checkbox"/> Pulleys, belts, gears, pinch points <input type="checkbox"/> Walking/working on irregular surfaces <input type="checkbox"/> Work at heights > 6 ft <input type="checkbox"/> Roof access <input type="checkbox"/> Steep or slippery terrain <input type="checkbox"/> Other _____					
<input type="checkbox"/> Discharges to Air <input type="checkbox"/> Produces criteria pollutants (e.g., organics, NOx, ozone, outdoor dust) <input type="checkbox"/> Source regulated by Air District <input type="checkbox"/> Hazardous Air Pollutants (e.g., beryllium, radioactive materials) used <input type="checkbox"/> Solvents, adhesives, coatings <input type="checkbox"/> Exhaust ventilation <input type="checkbox"/> Potential to emit other air pollutants <input type="checkbox"/> Other _____					
<input type="checkbox"/> Discharges to Water/ Soil/ Groundwater <input type="checkbox"/> Discharge of process water to sanitary sewer or septic system <input type="checkbox"/> Discharge to ground/soil or storm drain system <input type="checkbox"/> Connection to retention tank, percolation pits <input type="checkbox"/> Categorical process (e.g., metal finishing, electronics) <input type="checkbox"/> Other _____					
<input type="checkbox"/> Ecological and Cultural Resources <input type="checkbox"/> Disturbance to soils, drainage channel, stream bed, floodplain, natural habitats, wetlands, buffer zone, other undisturbed area <input type="checkbox"/> Work in area designated as having cultural resources <input type="checkbox"/> Work in area designated as sensitive habitat <input type="checkbox"/> Other _____					
<input type="checkbox"/> Electrical <input type="checkbox"/> Batteries (short circuit >10 A or >50 V) <input type="checkbox"/> Capacitors (>10 J electrical energy) <input type="checkbox"/> Electrical power source (>140 V or > 30 A or >10 J of electrical, or 2 or more sources of electrical power.) <input type="checkbox"/> Energized electrical equipment (work on exposed, energized electrical equipment >50 V, 20 A, or portable equipment at other than ground potential) <input type="checkbox"/> Static electricity <input type="checkbox"/> Hi-potential testing (>500 V) <input type="checkbox"/> Other _____					
<input type="checkbox"/> Emergencies/Earthquakes/Fire <input type="checkbox"/> Potentially unique emergency issues <input type="checkbox"/> Unique earthquake safety issues <input type="checkbox"/> Unique fire safety issues <input type="checkbox"/> Other _____					
<input type="checkbox"/> Explosives/Firearms <input type="checkbox"/> Explosives, high explosives, propellants, pyrotechnic or similar energetic material <input type="checkbox"/> Mock explosive <input type="checkbox"/> Firearms <input type="checkbox"/> Other _____					
<input type="checkbox"/> Pressure/Noise/Hazardous Atmospheres <input type="checkbox"/> Low Pressure systems <150 psig-gas, <1500 psig liquid, <100 kJ stored energy <input type="checkbox"/> High pressure system >150 psig -gas or >1500 psig liquid >100 kJ stored energy <input type="checkbox"/> Pressure systems containing hazardous fluids <input type="checkbox"/> Vacuum systems <input type="checkbox"/> Cryogenics <input type="checkbox"/> Noise (> 85 dB) <input type="checkbox"/> Confined spaces/ oxygen deficiency, asphyxiant <input type="checkbox"/> Hazardous atmospheres (e.g., hydrogen gas) <input type="checkbox"/> Other _____					

Integration Work Sheet (IWS)

PART III HAZARDS/ENVIRONMENTAL ASPECTS & CONTROLS <i>(continued)</i>								
<input type="checkbox"/> Radiation- Ionizing/Non-Ionizing <input type="checkbox"/> Radioactive material (encapsulated, non-encapsulated) <input type="checkbox"/> Fissionable material in excess of Table 1 in Doc 20.6 ES&H Manual <input type="checkbox"/> Radiation-generating devices (RGD) (accelerator, x-ray machine, e-beam, high voltage in a vacuum) <input type="checkbox"/> Non-ionizing radiation – class 3a – unattended or invisible, 3b, or 4 lasers, or intense UV, visible, or infrared illumination <input type="checkbox"/> Electric/ magnetic fields < 3 kHz <input type="checkbox"/> Radio frequency/microwaves sources > 3 kHz <input type="checkbox"/> Other _____								
<input type="checkbox"/> Remediation and Monitoring <input type="checkbox"/> Grading or excavating in contaminated areas <input type="checkbox"/> Movement of soil <input type="checkbox"/> Disturbing contaminated groundwater <input type="checkbox"/> Other _____								
<input type="checkbox"/> Storage Tanks <input type="checkbox"/> Wastewater retention tank <input type="checkbox"/> Tanks storing materials/products <input type="checkbox"/> Other _____								
<input type="checkbox"/> Temperature/Weather <input type="checkbox"/> Extremely hot or cold surfaces, steam (burn hazard) <input type="checkbox"/> Weather exposure or temperature extremes (harsh weather, lightning, temperature extremes) <input type="checkbox"/> Exposure to intense sunlight <input type="checkbox"/> Other _____								
<input type="checkbox"/> Transportation <input type="checkbox"/> Hazardous material or waste transportation <input type="checkbox"/> Radioactive material or waste transportation <input type="checkbox"/> Transportation of material between sites <input type="checkbox"/> Use of vehicles (aircraft, ATV, boat) <input type="checkbox"/> Off-road driving <input type="checkbox"/> Other _____								
<input type="checkbox"/> Waste <input type="checkbox"/> Hazardous waste <input type="checkbox"/> Radioactive waste <input type="checkbox"/> Medical waste <input type="checkbox"/> Mixed waste or other waste with no disposal option <input type="checkbox"/> Solid wastes (> routine quantities) <input type="checkbox"/> Material for recycling <input type="checkbox"/> Other _____								
<input type="checkbox"/> Worker Capability/Motion <input type="checkbox"/> Lifting manually >30 pounds <input type="checkbox"/> Work involving repetitive motion <input type="checkbox"/> Hand tools <input type="checkbox"/> Work alone <input type="checkbox"/> Work after hours <input type="checkbox"/> Work involving individuals <18 years of age <input type="checkbox"/> Work requiring specific unusual physical capabilities <input type="checkbox"/> Other _____								
<input type="checkbox"/> Other <input type="checkbox"/> Hazards or environmental aspects not listed: _____								
Hazard Description and Controls: <i>Describe each hazard listed above and the specific controls: (engineered controls, personal protective equipment, etc.)</i>								
Hazard Description	Control							
Training: <i>List the required training and the individual requiring the training by name</i> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%; text-align: left;">Name</th> <th style="width: 30%; text-align: left;">Employee #</th> <th style="width: 40%; text-align: left;">Course#</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="height: 40px;"> </td> </tr> </tbody> </table>			Name	Employee #	Course#			
Name	Employee #	Course#						
PART IV SITE LOCATION/DIRECTORATE ADDITIONS								
Site Location/Directorate-Specific Additions: <i>Site location (e.g., S-300, NTS, off-site) or Directorate-specific additions can be added here.</i>								
PART V ES&H DOCUMENTS/PERMITS/APPROVALS MEDICAL SURVEILLANCE								
ES&H Documents / Permits / Approvals / Medical Surveillance: <i>The following controls are required:</i> <input type="checkbox"/> ES&H Documents needed: <input type="checkbox"/> IWS only-(WAL B) <input type="checkbox"/> IWS & Safety Plan- (IWS/SP-WAL C) <input type="checkbox"/> Other ES&H Documents: _____ <input type="checkbox"/> LLNL Work Permits/Approvals: _____ <input type="checkbox"/> Agency Work Permits/Approvals: _____ <input type="checkbox"/> Medical Surveillance/Certification: _____								
PART VI SIGNATURES								
<i>As the RI, I have reviewed the hazards and agree to implement the controls identified in this IWS:</i> Responsible Individual (RI): _____ Date: _____ <i>The proposed work falls within the safety envelope of the facility/area and may commence once authorized:</i> FPOC Concurrence _____ Date: _____ FPOC Concurrence (if required) _____ Date: _____ <i>I have reviewed the hazards and controls for this work and concur that the work may commence once authorized:</i> Site Location/Directorate Specific Concurrence (if required) _____ Date: _____ <i>The hazards and controls have been properly identified and the work may commence once authorized (Note: ES&H Team or designee concurrence is required for WAL B; ES&H Team concurrence is required for WAL C.)</i> ES&H Concurrence: _____ Title: _____ Date: _____ Approval: <i>The controls have been confirmed and this proposed activity is authorized to proceed.</i> Authorizing Individual (AI) _____ Date: _____								

Integration Work Sheet (IWS)

To be completed by the ES&H Team or their Designee or the RI (Transfer information on the checked items to Part V of the IWS form)

ES&H Documents:

- ☐ IWS only needed (WAL B- ES&H Team or designee concurrence required)
☐ IWS & Safety Plan (IWS/SP) needed (WAL C - ES&H Team concurrence required)

☐ Other ES&H Documents needed:

- ☐ Safety Basis document update needed (e.g., USQ or other)
☐ Engineering safety note needed
☐ NEPA document needed
☐ Job Hazard Analysis needed (JHA) _____

☐ Other: _____

Attach required documentation or list where the documents can be found: _____

LLNL Permits/Approvals/Consultations/Reporting:

- ☐ Building and/or equipment drain
☐ Interior concrete floor, wall, and ceiling penetration
☐ Asbestos permit
☐ Confined space permit
☐ Hot work
☐ Hazardous work permit (ES&H Manual Doc. 17.1 Sec. 3.18)
☐ Lead work
☐ Radiation work permit
☐ Roof access
☐ Soil excavation, grading, and/or drilling permit
☐ CMID tag needed
☐ Radioactive waste
☐ Waste minimization analysis needed
☐ Energy efficiency or water conservation analysis needed
☐ LLNL Committee approval (committee name) _____
☐ Other: _____

Agency Work Permits/Approvals:

- ☐ Air permit/exemption
☐ NESHAP
☐ Waste permit/exemption
☐ Water discharge permit/exemption
☐ Fish and Wildlife consultation
☐ Other: _____

Medical Surveillance/Certification:

- ☐ Asbestos worker
☐ Beryllium worker
☐ Works with Biohazards
☐ Works with Carcinogens
☐ Hazardous Waste worker
☐ Hearing Conservation required
☐ Lead handler
☐ Commercial Drivers License required
☐ Crane Operator
☐ Explosives worker
☐ Firefighter
☐ Laser Eye exposure potential
☐ Respirator required
☐ PAP ☐ PSAP ☐ PSO _____
☐ Other: _____

Appendix C

Facility Authorization Structure, Prestart Reviews, and the Graded Approach

Each facility is subject to a safety analysis to identify and evaluate the associated hazards and to determine the appropriate facility categorization. Consistent with the graded approach process, the effort expended in the facility safety analysis is determined by the hazards and risks associated with the facility. The safety analysis ranges from a facility screening report to a detailed analysis that is performed in preparation for establishing the authorization agreement with NNSA for selected facilities. Details of the facility safety analysis process are described in Document 3.1. Based on the facility safety analysis, one of the Facility Authorization Levels (FALs) identified in Table C.1 will be established. A facility that has several types of hazards requires the highest of those FALs that correspond to each type as determined in a facility safety analysis. This appendix describes the various FALs and associated requirements.

For each FAL, formal control and approval/concurrence requirements have been established to ensure safety is properly and consistently addressed. All work performed in a facility must be consistent with the safety basis envelope established during the facility authorization. For this reason, facility management concurrence is required for all activities to be performed in the facility other than those commonly performed by the public. Facility management concurrence also ensures that the various work activities within the facility are compatible. It is through the interaction between facility management maintaining the safety envelope and the management chain retaining responsibility for work activities performed in that facility that LLNL maintains the connectivity between ISM requirements established for the facility and for work activities.

An FSP is required for each hazard-ranked facility rated at FAL 2 through 8. A Directorate may elect to use a single FSP to cover multiple facilities. Details on the preparation of FSPs are contained in Document 3.3. In no instance may a safety plan extend operations beyond operations covered by a safety basis document (e.g., SAR, DSA, or SAD). Such cases require that the revision process for the safety basis document be followed. Depending on the FAL, the revision process starts with the preparation of an Unreviewed Safety Issue (USI), Safety Question Review (SQR), or Unreviewed Safety Question (USQ).

Depending on the FAL, a prestart review may be required. The following topics are the minimum requirements for review and discussion while conducting and documenting ES&H related prestart reviews. The depth / detail of the review and the formality / documentation of the review vary with the complexity of the facility and the level of hazards.

- A description of the facility purpose and activities. Include appropriate technical specifications.
- A discussion of the hazards.
- A discussion of the controls.
- A discussion of the work plan, including how the work will be done, phases, milestones, etc.
- A review of the safety documents.
- A review of special, activity related training requirements and accomplishments, as applicable.
- A review of maintenance plans, interlock inspections, etc. as applicable.
- A review of environmental documentation (NEPA, permits, cultural resources, endangered species, etc.).

Facility Authorization Levels

Facility Authorization Level 1 (FAL 1): General Industry Facilities. Facilities with operations involving hazards in activities commonly performed by the public (e.g., office activities) or that have been established by a Facility Screening Report to have negligible impacts onsite and offsite from non-routine hazards are categorized as general industry. General industry facilities operate according to the provisions of the *ES&H Manual* and applicable Work Smart Standards. No facility-specific safety documentation is required other than the Facility Screening Report; however, to have a complete and conscious process, the facility operation authorization is included in the Facility Acceptance for new general industry facilities.

FAL 1 Prestart Review: The prestart review consists of the RI (facility manager or equivalent) reviewing the facility's construction punch list and assuring that all items needed for safe occupancy are completed. In particular the RI should assure that all safety related systems (e.g., fire detection, alarm, and suppression systems) are fully operational. The RI may want to discuss specific topics with ES&H SMEs, FPOC, directorate management, and building residents. No documentation of this review is required.

Table C-1. LLNL Facility Authorization Structure.

Hazard Level/ Facility Category	Hazard Analysis Mechanism	Controlling Documentation ^(b)	Facility Operation Authorization			
			Facility Authorization Level	Approval	Concurrence ^(c)	Type of Prestart Review
General Industry	Facility Screening Report (FSR)	FSR and ES&H Manual	1	Facility AD	ES&H Team Leader	Facility Acceptance
Low Hazard	Hazard Analysis Report (HAR)	HAR and Facility Safety Plan (FSP)	2	Facility AD	ES&H Team Leader	Prestart Review
Radiological	HAR	HAR and FSP	3	Facility AD	ES&H Team Leader	Prestart Review
Accelerator	Formal Safety Assessment	Safety Assessment Document (SAD) & FSP	4	Facility AD & NNSA/OAK	Hazards Control Dept. Head	Accelerator Readiness Assessment
Moderate Hazard	Formal Safety Analysis	Safety Analysis Report (SAR) & FSP	5	Facility AD & NNSA/OAK	DDO	Readiness Assessment
Explosives	Formal Safety Analysis	SAR & FSP	6	Facility AD & NNSA/OAK	DDO	Readiness Assessment
Nuclear Hazard Category 3	Formal Safety Analysis	SAR (DSA ^(a)) & Technical Safety Requirements (TSRs) & Authorization Agreement, as applicable & FSP	7	Facility AD & NNSA/OAK	DDO	Operational Readiness Review (ORR)
Nuclear Hazard Category 2	Formal Safety Analysis	SAR (DSA ^(a)) & TSRs & Authorization Agreement & FSP	8	Facility AD & NNSA/OAK	DDO	ORR

NOTES:

(a) Documented Safety Analysis after April 10, 2003.

(b) FSP approval is by the Facility AD with concurrence by the ES&H Team Leader.

(c) Concurrence for safety basis documents.

Facility Authorization Level 2 (FAL 2): Low hazard facilities. Facilities with the potential for minor onsite or negligible offsite impacts are categorized as low hazard. The evaluation of the facility and its hazards are documented in a Hazards Analysis Report, which is approved by the Facility AD with concurrence from the ES&H Team. The HAR establishes the safety basis envelope. In addition to the HAR, each low hazard facility has an FSP that is used to communicate requirements for performing work in the facility. The FSP serves as the governing document for the facility operations, but must remain consistent with the evaluation documented in the HAR. A prestart review is required prior to the operation of any new, or significantly modified low hazard facility.

FAL 2 Prestart Review: The prestart review is conducted at the direction of the AI, after the RI declares that he or she is ready for the prestart review. The AI assembles an appropriate review team, which may consist of peers, SMEs, and the FPOC or FM. Selection depends on the identified hazards and complexity of the facility. Review team members shall not review their own work. The review team should consist of sufficient and diverse people to adequately evaluate facility readiness. The review may include formal presentations describing the work activity, the hazards, the controls, and the results anticipated from the work. The review shall include a review of the IWS and its associated safety plans, referenced safety documents, and the facility conduct of operations matrix (see Document 3.5). It may also include drawings and diagrams. The review should also include discussions with the staff members. A written report shall be sent to the Facility AD, with copies to the Facility AD's assurance manager and the facility manager's line management. The report shall address the topics reviewed and evaluate the readiness to begin operations. If deficiencies or opportunities for improvement are identified, they shall be included in the report. The report shall identify items that have to be corrected before work can proceed, and those that can be corrected while the activity is being conducted. A record of the prestart deficiencies and their correction is required. Post-start deficiencies should be tracked in a facility or program tracking system to completion. The Facility AD approves the start or restart of the facility.

Facility Authorization Level 3 (FAL 3): Radiological Facilities. LLNL radiological facilities are those facilities where work is conducted using radioactive materials and are categorized as such according to the requirements of DOE EM-STD-5502-94. The radiological material inventory is controlled to remain below the Category 3 levels specified in DOE EM-STD-5502-94, thus radiological facilities do not have the potential to cause significant localized consequences. The determination that a facility is a radiological facility is established in the HAR, which is approved by the Facility AD with concurrence from the ES&H Team Leader. The FSP contains controls adequate to perform operations in the facility safely and consistently with the safety envelope established by the HAR. A prestart review is required prior to the operation of any new, or significantly modified LLNL-designated radiological facility.

FAL 3 Prestart Review: The prestart review requirements are the same as those for a low hazard facility.

Facility Authorization Level 4 (FAL 4): Accelerator facilities. For facilities having accelerators as defined in DOE O 420.2, the safety basis envelope is documented in an accelerator-specific Safety Assessment Document (SAD). The SAD is prepared, concurred with by the Hazard Control Department Head, and is approved by the Facility AD and NNSA/OAK. An FSP documents the controls applicable to the accelerator, including those that ensure the safety envelope and compatibility of the work activities conducted under the auspices of the SAD. An Accelerator Readiness Assessment is required prior to the operation of any new, or significantly modified accelerator facility.

FAL 4 Prestart Review: The Accelerator Readiness Assessment requirements are the same as those for a low hazard facility prestart review, with two additions: compare the safety plans with the hazards identified and limitations discussed in the SAD and the Facility AD and NNSA/OAK together approve the start or restart of the facility.

Facility Authorization Level 5 (FAL 5): Moderate hazard facilities. Facilities with considerable potential for onsite impact, but at most only minor offsite impact, are categorized as moderate hazard. The determination that a facility is moderate hazard is documented in a facility-specific Safety Analysis Report (SAR). The SAR is prepared, concurred with by the Hazards Control Department Head, and approved by the Facility AD and NNSA/OAK. The SAR establishes the agreed-upon safety envelope within which safety plans must fit. The controls defined in the safety plan shall be adequate to ensure the safety basis envelope established by the SAR is maintained, and that work activities conducted within the facility are compatible. A Readiness Assessment is required prior to the operation of any new, or significantly modified moderate hazard facility.

FAL 5 Prestart Review: The Readiness Assessment requirements are the same as those for a low hazard facility prestart review, with two additions: compare the safety plans with the hazards identified and limitations discussed in the SAR and the Facility AD and NNSA/OAK together approve the start or restart of the facility.

Facility Authorization Level 6 (FAL 6): Explosives facilities. An explosives facility is defined as a structure of defined area used for explosives storage or operations. Excluded are explosives presenting only localized, minimal hazards as determined by the Authority Having Jurisdiction. The safety analysis process is documented in a facility-specific SAR. The SAR is prepared, concurred with by the Deputy Director for Operations, and approved by the Facility AD and NNSA/OAK. The SAR establishes the agreed-upon safety envelope within which the FSP and any safety plan must fit. The controls defined in the facility's governing documents are to be adequate to ensure the

safety basis envelope and the compatibility of work activities. A Readiness Assessment is required prior to the operation of any new, or significantly modified explosives facility.

FAL 6 Prestart Review: The Readiness Assessment requirements are the same as those for a low hazard facility prestart review, with two additions: compare the safety plans with the hazards identified and limitations discussed in the SAR and the Facility AD and NNSA/OAK together approve the start or restart of the facility.

Facility Authorization Level 7 (FAL 7): Category 3 nuclear facilities. Nuclear facilities are categorized according to the requirements of DOE STD 1027-92, based on radioactive material inventory and radiological activities. The determination that a facility is a category 3 nuclear facility is made in a facility-specific SAR (Documented Safety Analysis after April 10, 2003). Technical Safety Requirements (TSRs) are generated to identify the key safety parameters associated with the safety basis envelope or associated work activities. The SAR (DSA) and TSRs establish the agreed-upon safety envelope within which any safety plan must fit. These documents define sufficient processes, controls, and limits to ensure that the facility is operated safely and in conformance with applicable requirements. Category 3 nuclear facilities may also require an authorization agreement. With institutional concurrence from the DDO (or designee), the Facility AD and NNSA/OAK approve the SAR (DSA), and TSRs. The FSP is approved by the Facility AD with concurrence of the Hazards Control ES&H Team Leader.

FAL 7 Prestart Review: Formal Operational Readiness Reviews (ORR) or Readiness Assessments (RA) are required for startup or restart. See Document 51.4, "Startup and Restart of Nuclear Facilities."

Facility Authorization Level 8 (FAL 8): Category 2 nuclear facilities. Nuclear facilities are categorized according to the requirements of DOE STD 1027-92, based on radioactive material inventory and radiological activities. The determination that a facility is a category 2 nuclear facility is made in a facility-specific SAR (DSA after April 10, 2003). TSRs are generated to identify the key safety parameters associated with the safety basis envelope. Category 2 nuclear facilities also require an authorization agreement, which in conjunction with the SAR (DSA) and TSRs establish the agreed-upon safety envelope within which any safety plan must fit. These documents define sufficient processes, controls, and limits to ensure that the facility is operated safely and in conformance with applicable requirements. With the concurrence of the DDO (or designee), the Facility AD and NNSA/OAK approve the SAR (DSA), TSRs, and authorization agreement. The FSP is approved by the Facility AD with concurrence of the Hazards Control ES&H Team Leader.

FAL 8 Prestart Review: Formal Operational Readiness Reviews (ORR) or Readiness Assessments (RA) are required for startup or restart. See Document 51.4, "Startup and Restart of Nuclear Facilities."

Appendix D

Off-Shift Emergency or Urgent Response

The following procedure shall be followed by those affected for off-shift emergency or urgent response.

1. If safe to do so, take those immediate steps needed to make it safe and/or stabilize any emergency situation. Examples of this type of action include: securing power to equipment, securing low conductivity water (LCW) or water supply lines, adjusting equipment settings to reduce load on stressed components, and securing access to an area affected by an emergency.
2. Once the emergency is secured – STOP. Carefully assess the current situation and call for additional resources, as needed. If not already present, contact the Off-Shift Health and Safety (H&S) Technician (2-7595) for ES&H advice and consultation.
3. Obtain information on facility-specific ES&H considerations with the off-shift H&S Technician. (The Off-Shift technician may contact the local ES&H Team Leader or facility personnel for additional support or information as needed.)
4. If a generic or blanket IWS adequately covers the work to be done (including facility specific considerations), verbal concurrence by the FPOC is appropriate. A formal concurrence should be done on the next business day via the completion of a bridging document.
5. The ES&H Team Leader or designee, FPOC and/or Room Responsible Person may provide facility specific controls verbally, or may have appropriate personnel respond to the situation for further evaluation.
6. Verbal controls provided to augment generic IWSs and the Team Leader/FPOC concurrence will be documented or referenced in the Off-Shift H&S Tech log and the edited IWS.
7. When an off-hours repair involves ES&H Team or facility personnel responding to the site, a new handwritten IWS or edited generic/blanket IWS will be generated in the field and signed off by the ES&H Team Leader or designee and the FPOC or designee. This sign off provides immediate authorization to carry out the urgent repair. Any associated documentation (HACs, hot work permits, etc.) will also be generated and approved at this time.
8. Any principals not present during the off-hours response will formally sign off the handwritten IWS the next business day following in-field approval. A job-specific IWS adding the verbal instructions into the generic IWS will be entered into the electronic IWS system on the next business day. Formal reviews of the field generated IWS will be completed per normal review practices.

9. Any considerations that were missed during the in-field review will be discussed with appropriate Plant Engineering, FPOC, and ES&H Team personnel. As appropriate, these concerns will be documented via Lessons Learned or other appropriate feedback mechanisms to ensure they are considered on future jobs.